Vol. 1, No. 12
December 1986

$1.50

PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio

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DR-200 DUAL-PORT

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PACKET RADIO MAGAZINE is published monthly by the Florida Amateur Digital Communications Association, Inc., 812 Childers Loop, Brandon, FL 33511. (813) 689-3355. Printed in USA. FADCA is a non-profit Florida corporation dedicated to research, development, education, and public service through amateur digital communication activities.

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POSTMASTER: Forwarding and return postage guaranteed/address correction requested. Please send form 3579 to 812 Childers Loop, Brandon, FL 33511.

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Articles and photographs are solicited dealing with any aspect of digital communications. Both technical and operational topics are desired including new product announcements and equipment reviews.

CAPRA News

```
Msg# TR  Size  To     From    @ BBS  Date
5456 BN  1966 CAPRA  WB9MJN          861118
```

TCP/IP Test Operation

Hi, Sunday night WB9WBN, myself and WD9DBJ brought up Phil Karn's TCP/IP code on the air. We operated the code on top of an AX.25 connect. We were unable to operate the code via unproto mode. Mike Chepponis, K3MC, has a KISS EPROM for TNC-2s that will allow unproto operation without the callsign denotations. So we had to settle for connecting to each other, then bringing up the TCP/IP code. Jerry, had two stations on, WB9WBN-1 and WB9WBN. Both of these stations were connected into the TCP/IP computer, and the code was alerted to the dual ports. I connected to WB9WBN-1 via WB9WBN via AX.25 , and Dick connected to WB9WBN v N9ATM-2. Then we both brought up TCP/IP connects to Jerry's stations. With this accomplished, the TCP/IP node at WB9WBN now knew that both of our IP addresses were live on the net. Then Dick and I , although not cconnected via AX.25 connected with TCP/IP. What happened when we did this is what we have all been waiting for. Dick's packets were sent to station WB9WBN, then into his TCP/IP computer, which then brought up station WB9WBN-1 and told my station of the connect thru the total WB9WBN site to WD9DBJ. When Dick would send some data, the data would go out via N9ATM-2 to WB9WBN, the data packet would get acked in AX.25, and then the TCP\IP ack from WB9WBN would be sent back to Dick's station and acked in AX.25 by Dick's station. At the same time the TCP/IP ack left WB9WBN, WB9WBN-1 sourced a TCP/IP data packet to me, and my station acked in AX.25. Then my station would send a TCP/IP ack, and finally to end everything, WB9WBN-1 returned a AX.25 ack to me for the AX.25 data packet that contained the TCP/IP ack. Although this was somewhat slow, elemination of the AX.25 acks would have speeded it up a whole bunch. This is the aim of the new KISS EPROM for the TNC-2.

73, Don

- PRM -

PARTICIPATING ORGANIZATIONS

ALA-NET - Alabama Packet Radio Association
CAPRA - Chicago Area Packet Radio Association
FADCA - Florida Amateur Digital Communications Association
GRAPES - Georgia Radio Amateur Packet Enthusiasts Society
KCAPRG - Kansas City Area Packet Radio Group
LAPRS - Louisiana Amateur Packet Radio Society
MAPRC - Mid-Atlantic Packet Radio Council
MARDA - Mississippi Amateur Radio Digital Assn.
PPRS - Pacific Packet Radio Society
PTG - Packet Technical Group (Detroit area)
RMPRA - Rocky Mountain Packet Radio Association
TAPR - Tucson Amateur Packet Radio Corporation
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BEST OF MFJ

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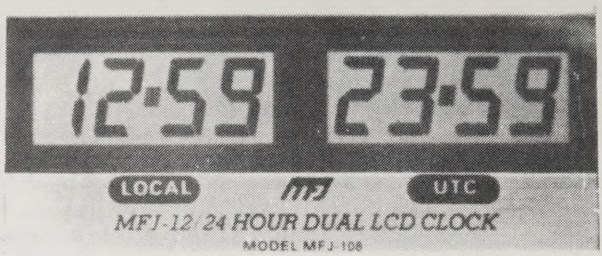

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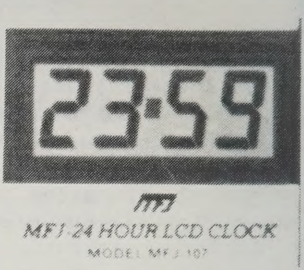

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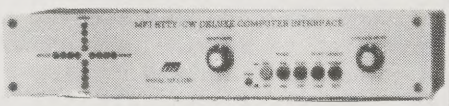

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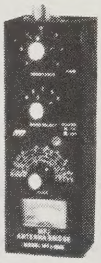

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge that you can take to your antenna site—no other equipment is needed.

You can determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest and most convenient way to determine antenna performance available today to anyone. There's nothing else like it and only MFJ has it. Built-in resistance bridge, null meter and tunable oscillator-driver (1.8-30 MHz). Uses 9 V battery. 4 x 2 x 2 inches.

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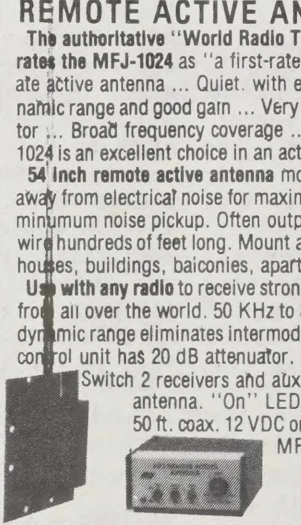

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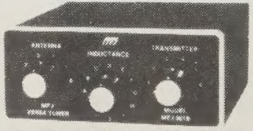

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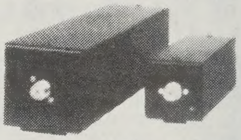

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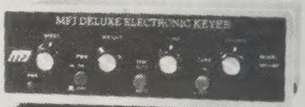

MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7 x 2 x 6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

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Steven K. Roberts
Bainbridge Island, WA

I suppose this machine really does look strange to people. I've been living with it for so long that I usually only see a list of uncompleted projects ranging from waterproofing to CMOS logic design. But when I ride down the street, people gape, and the local media are having a field day. Front page color in the Seattle Times; PM Magazine this week. Ah, this life of high-tech nomadics...

Of course, I deliberately frolic in that strange region where the distinctions between technology and magic blur -- where anything you say will be believed because your looks alone overwhelm the senses. The other day I was at the Streamliner Diner, immersed happily in a flawless omelette and watching the crowd around the bike. A mother walked by with her 4-year-old boy.

"Hi there, sonny," I said into the handheld transceiver. Through low-power 2-meter simplex, my voice was conveyed to the Winnebiko -- where it crackled from the console speaker. The kid froze, uncertain. He stared at the machine, ready to cry if necessary. "So what do YOU want for Christmas?" it asked him.

His eyes widened as his mother scanned the area to find the hidden camera. "I want a train, and a bicycle, and..."

"A bicycle like me?"

The boy's face lit up in pure wonder. "Yes."

"Well, we'll see what we can do about that." His mother began tugging him along the sidewalk. But he resisted long enough to gaze at the machine and wave solemnly.

"Bye-bye, Mr. Bicycle."

Of course, such play is only the beginning. Since the bottom line of this venture is FUN, much of my development work centers upon system capabilities that are not entirely aligned with that steely- eyed business world that swallows up most otherwise well-intentioned computers. Today saw the 68HC11 and its custom interface logic spring to life -- not all debugged yet, of course, but getting there. The bike can now make comments in its synthesized voice, from "please do not touch me" when it detects vibration, to "oh no... here he comes again," when a radioed touch-tone command lets it know that I've finished lunch and am about to add my body to its 225-pound static load.

Hey, why not? Computers *should* be fun, shouldn't they?

Speaking of fun, life on Bainbridge Island continues to be a mingling of obsessive design work and pure pleasure. A few days ago Maggie and I hopped on a couple of Octo Company's resident mountain bikes -- agile machines with automatic transmissions, quite unlike the lumbering megacycles we are about to call home. Off into the woods we went, into deep green antiquity, whispering through silence so deep that our clicking freewheels seemed as grating as chainsaws. All around us were the projections of past and future: long-dead trees sinking into the forest floor below new growth sprouting green and perky into patches of flickering sunlight. Yeah, thanks for the reminder... we're just passing through...

As a hint of approaching sunset pinked the sky, we emerged from the woods onto Manzanita Bay and found a spot by the clear water. A sky show was beginning, humbling us further, drawing us into a sweet melancholy touched with awe. Dancing gold on the watertop, clouds gilt-edged platinum, textures from the crystalline to the vaporous, moment-to-moment changes too subtle to notice and too powerful to ignore. This, folks, was a world-class light show, and I remember chuckling at the memory of those dancing lights that held me enraptured night after night, back in the strange 70's. In this electric sky there was beauty profound enough to tickle our lachrymal ducts and elicit soft moans of sensual appreciation.

And there was more. We ferried to the City, upstream at rush hour, smiling our way through a flood of grim commuter faces racing the clock as always. We strolled to the Opera House and were suddenly surrounded by the expert musical caress of Andreas Vollenweider and friends -- jazz harp, flutes, synthesizers and percussion. Perfect. The group explored acoustical textures as colorful and delicate as that sunset, raising goosebumps, raising the roof, raising awareness. At the last standing ovation, Andreas quietly spoke, "thank you."

"No, thank *you*!" someone cried out, and the applause swelled again like another onslaught of Olympic rain. This was not ordinary music, this extended orgasm of sound; this was exquisite proof of Beethoven's insightful observation that "everything in music must be at once surprising and expected."

Ah, rhapsody, rhapsody. As the Road gets closer, I renew my resolve to spend my life meeting remarkable people, seeking the pleasures of growth and discovery, and smiling as much as possible. What an odd land this is, where a bicycle loaded with computer systems can be a ticket to exactly that. (As a British lady at Expo observed, while looking at my bike: "Only in America!")

See you next week. We'll be on the island a while longer, and will then pedal frantically south as winter begins its warning chill. I suppose everything in my life is surprising and expected, as well...

- PRM -

PPRS

PACIFIC PACKET RADIO SOCIETY

. . . Site Of The First U.S. Digipeater

President's Report

Walter E Miller, AJ6T
PPRS President

NEW NORCAL PACKET FREQS ANNOUNCED

NARCC has approved four new 2 meter packet channels in Northern California on 144.99, 144.97, 144.93 and 144.91 MHz. Exisiting remote base voice operations on 144.95 preclude sanctioning of that channel now. At the recent meeting of Northern California BBS sysops it was agreed that 144.91 would be reserved as a channel with no BBS activity. Sanctions for new digis and BBS on these channels should be obtained through George Flammer, WB6RAL, the NARCC frequency coordinator.

NORCAL BBS SYSOPS MEET IN RICHMOND

A big meeting of almost all of the Northern California BBS sysops and other interested parties was held at the Richmond Red Cross on Nov 22, 1986. The meeting was called to bring some order to the chaos on 145.01, and to make plans for more efficient packet networking. The following groups were represented: EBPRA, GVPS, PPRS, SACPAC, SF Radio Club, and W6AMT. The discussions were wide ranging and often disjointed. NI6A announced that WESTNET now has links into Utah, Colorado, New Mexico and Texas. There was a lot of discussion about congestion on 145.01 and how to reduce it. WB6RAL complained that there has been no sysop coordination until now. "Prime time" was defined as 5 PM to 2 AM local time, and the Sysops agreed on a voice vote not to forward traffic on 145.01 during prime time (so that users would be free to access the BBS in the evenings after work, and to make other connections without BBS QRM). AA4RE will keep a registry of 2 meter forwarding time slots. WB6RAL announced plans for an AMT 1200 baud parallel network on 223.58, and AJ6T announced PPRS plans to support such a network with long term loans of TNCs to digipeater operators on that channel. There was very strong approval among the group for such a backbone network (which would be used mainly for BBS trunking). WB6RAL said the AMT group would have a 220 machine up on Crystal Peak by the end of the year, and that new level 3 code was being written for the 2 meter AMT chain. WORLI was "shocked" that local stations were not assigned to LANs here in California as they are in EASTNET. WD6BFC suggested that all stations sign their messages with the @ symbol (for example, AJ6T @ N6IIU-1) to ease the routing problem. WA6FWW promoted the concept of BBS as an archival storehouse with a very large data base; others objected strongly to the idea of a BBS as a "magazine stand." WB9LOZ announced a new BBS, W6PW-3, in San Francisco on 144.99 (with autoforwarding on 145.09 from 12-6 AM). WORLI and N4CHV described the evolution of the 20 meter packet network, and offered their stations as HF gateways for crosscountry linking. There was some discussion of the HF STA in preparation by the ARRL (the STA reportedly will not be submitted to the FCC until June 1987). WORLI announced that he will not write any more updates to the original version of his autoforwarding BBS software (11.6 is the last official version); however, he is writing an entirely new compatable BBS program in "C" which can be compiled for use on virtually any computer. This new code should be available by Christmas, and it will be distributed via Compuserve and other channels. Standard message headers were discussed briefly, but no general agreement was reached on that topic. N6JLJ pointed out that packeteers have not focussed much on emergency communications and that issue needs higher priority. N6KL described an interesting system based on WA8DED host mode for automatic tracking of emergency relief workers and their families. After the meeting NI6A conducted a tour of W6CUS-1 BBS which is located at the Richmond Red Cross. The sysop group will meet again next year in Sacramento.

PPRS "HARDWARE NIGHT" BIG SUCCESS

The annual PPRS December "hardware night" meeting was well attended. N6KL brought AA4RE's PAC-COMM PC-100 dual port packet controller on a half size IBM PC plug in card (it features 2 serial channels and two AMD7910 modems). N6FQR showed us his old VADCG board (the granddaddy of all TNCs) and also brought N6IIU's portable packet station in a suitcase (TNC2, ICOM 220/440 rigs, TI Silent 700 printer terminal). KG6AF displayed an AEA PK232 and the brand new PK87 (the packet-only version of the PK232). The actual operational stations included the following: WD6CMU had an IC22A and Heath TNC1 clone plus WA8DED firmware running with a homebrew 68008 computer and hard disk; Eric demonstrated an experimental mailbox he wrote in "C" which features multiconnect capability. W6FAK brought two stations: KPC2/Wilson HT and PK80/TS711 running on a Compaq portable with Procomm 1.1 terminal program. WB6KHP brought a KPC1/Yaesu/Brother EP44 setup. AI8A demonstrated his level 3 station which consists of a TAPR TNC2 (with N2WX EPROMS), TS711, and an Atari 1040ST (running the public domain WA4GPF terminal emulator). AJ6T's setup was a TAPR TNC1 (with WA8DED firmware), IBM PCjr (running Procomm 2.42), and FT726R. There was a lot of RF flying around that night, and a good time was had by all.

OTHER PPRS NEWS

The 1987 PPRS officers are: President, Walt Miller, AJ6T; Vice President, Dave Palmer, N6KL; Secretary, Greg Campbell, WB6ASR; Treasurer, Bill Weaver, WA6FSP; Frequency Coordinator, George Flammer, WB6RAL.

Continued >>>

Packet 1200 Baud PSK

Tom Clark, W3IWI

12630 BN 570 ALL W3IWI 861119 Packet PSK first

This message is the first use of PSK on a packet BBS. At this time, I am connected to Jack, W3TMZ, on 145.800 PSK. Jack has his PBBS configured as as Gateway which is then connected to the main W3IWI PBBS on 145.05.

Jack is running a G3RUH packet modem, while the W3IWI PSK port is running the QEX/JARL/JAMSAT/TAPR prototype unit.

Our connection on 145.800 PSK seems to be rock-solid with zero retries.

I believe that the tests between W3TMZ and W3IWI are the first two-way PSK packet QSO at 1200 baud. Any challengers?

73 de Tom, W3IWI via W3TMZ via W3IWI

I also ran so quick sensitivity checks and found that I could cut my xmtr power by something like 20dB and still maintain a solid link. We were both using pretty normal TXDs and the only problem we experienced was some desense from local QRM with both links on 2M. The eye-patterns I see on Jack's PSK indicate that he has some work to do on equalization. Next test will be to make detailed comparison of demod performance of G3RUH vs. the QEX/JARL/JAMSAT TAPR prototype. Stay tuned for more news

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It is now time for me to get up on the soapbox with some more comments about PSK in the 'real world': I now have somebody to test PSK with on the air -- W3TMZ has his G3RUH board running and we have been running PSK packets between us on 2M for the past 3 nites. Jack has not yet implemented the 1600 Hz tone 'PSK' modulator and is still using the stock 1200 Hz 'Manchester' configuration (see previous notes to clarify the definitions I am using). With Jack's Icom radio, the modulation spectrum with the 1200 Hz carrier is clearly not centered in the radio's passband. Looking at eye patterns on this end of the path, the 600 Hz data component (arising from alternating 1/0 sections in the 1200 baud data) is suppressed in amplitude by about 6-8 dB from the lower frequency components. On the other hand, the FO-12 spacecraft PSK, and the PSK I generate here locally with a 'carrier' freq of 1600 Hz, do not show the 600 Hz modulation component to be suppressed -- the eye-patterns are beautiful. Since any single bit error kills a packet, this would seem to indicate that our path is sub-optimum by at least 6 dB due to this condition.

Nevertheless, we tried some interesting tests last nite with Jack transmitting to me. Using the 20 dB attenuator built into the TS811 plus Jack's power output knob, we were able to twiddle things to 'hit the wall' described above. We then repeated the test using conventional AFSK-FM and found the 'wall' to be at a power level about 3 dB higher. Admittedly the measurements were crude, with an accuracy of only 1-2 dB, BUT!!!!!! That 3 dB plus the 6 dB that I know Jack will gain when he is able to use a 1600 Hz carrier would say that using PSK for convention terrestrial applications will yield a weak signal improvement of at least 9-10 dB. Those of us packeteering in metropolitan areas know that we have a serious spectrum resource problem. Our 5 FM channels from 145.01 to 145.09 are getting so crowded that often they become unusable. By going to PSK, channels could be spaced 3-4 kHz apart making something like 25-30 channels in the same spectrum we now use for five, and the performance will be better!

So this is a challenge to other experimentally minded folks, even if you have no interest in PSK on the FO-12 satellite: Let's start the second packet revolution! For your 1200 baud links, plan to break the tie with AFSK-FM Bell 202 modem standards. There is a much better way to do things!

- PRM -

While we're on Tom's favorite subject, namely packet "firsts", I should add that the very first high level protocol to run on top of the new 1200 bps BPSK modems was TCP/IP. During Tom's hotel room PSK demo at the recent AMSAT convention, I brought up my code on a PC clone and ran it through Tom's TNC, JAS PSK modem and 70cm radios. Naturally, it worked just fine!

Ordinarily, I'm more interested in doing something "right" instead of doing it "first", but since the opportunity for a propaganda coup arose I couldn't pass it up.

Phil R. Karn, KA9Q

- PRM -

PRESIDENT'S REPORT continued from page 4.

At the December general PPRS meeting the membership voted to continue our affiliation with Packet Radio Magazine. Please get your $18 dues for 1987 to PPRS no later than our next meeting on Tuesday, January 6, 1987 in order to receive PRM without interruption. Continued support of PPRS is essential if we are to donate/loan hardware to advancing packet networking in Northern California. The PPRS mailing address is PO Box 51562, Palo Alto, CA 94303.

During Thanksgiving vacation I was able to visit some of our northernmost PPRS members in Eureka. I had a very interesting meeting with Jack (KA6NEO), Pete (KE6LF) and Mike (KA6PGN). Their Humboldt Packet Radio Society has about 13 members. KA6NEO-1 and N6IJB-1 are the only digipeater routes out of the Eureka area. N6IJB-1 is solar powered, and it hits W6AMT-7 fine as long as the battery stays charged (but heavy use can outrun the solar recharge rate). Jack plans to upgrade KA6NEO-1 with a new antenna so that it can reach W6AMT-7 reliably (this digi shares a site with TV channel 6 and has desense problems). I hope the HPRS can keep us in touch with the packeteers in Oregon. KE6LF is interested in 6 meter meteor scatter packet experimentation-any takers?

I suspect that Santa will leave many new TNCs under Christmas trees this year, and that means we will see another influx of new packet users. Remember how tough and confusing those first few packet QSOs were for you? Keep that in mind and try to be helpful and courteous to our newest packeteers. Let's try to steer them toward good operating practices without becoming stern packet policemen.

- PRM -

The following info is so interesting, that I have pre-empted my usual monthly column to present it to you. Have a healthy, happy New Year! de NE5S

A Proposed Packet Station Locator and Router

Fred Hatfield, K8VDU @ WB5BZE
Box 52466 New Orleans, La. 70152
(504) 891-4862

At this stage of packet radio development, there is a fertile field for experimentation - automatic locating and routing of packets.

For years, I wrote software for calculating long distance telephone charges based on a grid of vertical and horizontal coordinates used by AT&T. These 'H & V' coordinates cover every central office in the continental United States, Hawaii, Alaska and Puerto Rico. The coordinates are available in published FCC tariffs and many commercial publishers of communication aids. (See FCC Tariff #264). A simple algorithm can be used to calculate mileage distances and will be presented in a BASIC program that can be used for testing this technique.

Each H and V coordinate is based on the physical location of the telephone central office serving that area. In other words, each digipeater location is uniquely identified by means of its area code and exchange. Note that it is not necessary to know the FULL telephone number, only the area code and exchange. If we think of the area code and exchange as a 6 digit 'key', it is simple to locate it physically by looking up the V and H coordinates. For example, my telephone number in New Orleans is 504-891 4862. Using the 6 digit key '504-891', I find my V and H coordinate is 8483 2638.

By using a sequence of look-up tables that contain digipeater or BBS identifiers with corresponding H and V coordinates, automatic routing paths can be automatically determined by software. Since the H and V coordinates will allow you to calculate distances and directions, a table arranged by vertical or horizontal coordinates in sequence with corresponding digi identifiers would allow the software to determine 'hops'to reach a predetermined destination.

In operation, the user need only to indicate the target location of the destination by digi ID (such as BTR or LCH). The program would scan the table which contains digi ids and their V and H coordinates. When the proper terminating digi is found, a route can be automatically determined by tracking the V and H coordinates between the source and destination. Since mileage and direction can be calculated from that information, the proper 'hops' can be determined for routing.

If you keep such tables available in your TNC software, they could be automatically updated from digis or BBS by means of sending a unique packet when connected. Of course, it is only necessary to do that if you don't already have them entered. A BBS could include the V and H coordinate as information in its beacon, thereby locating it uniquely if you should pick it up as 'DX'.

I have experimented with some of these ideas for the digis in Louisiana as supplied by the LAPRS DIGI/BBS MAP by NE5S and available on the WB5BZE BBS. For those of you who would like to experiment with this technique, I have supplied the BASIC program to calculate mileage distances and a table of V and H coordinates keyed to the LAPRS map. I can also supply V and H tables for any area code in the United States that will give unique locations for every exchange in that area code. The algorithm will work for any location in the United States.

LOUISIANA DIGI AND BBS H AND V COORDINATES

AEX = 8409 3168
BTR = 8476 2874
HMU = 8407 2755
IER = 8368 3318
JNZ = 8639 3106
LCH = 8679 3202
LFT = 8587 2996
MLU = 8148 3218
MSY = 8483 2638
RSN = 8185 3310
SHV = 8272 3495
SIL = 8395 2610

```
10 'Calculate Mileage Algorithm for Packet
12 'extracted from SCAN.TRA pgm <861128> fah
20 REM  <811002>  FAH
50 DIM M(6):M(1)=.9:M(2)=8.1:M(3)=72.9:M(4)=656.1
60 M(5)=5904.9:M(6)=53144.1
70 V1%=8483:H1%=2638 'default coordinates for MSY
100 INPUT "Enter V and H coordinates: ";V2%,H2%
110 GOSUB 3000
120 GOTO 100
130 STOP
3000 '====mileage calculation algorithm==========
3010 REM CALCULATE MILEAGE FROM V&H COORDINATES
3015 REM RETURN WITH MILEAGE IN MI%
3020 HM%=H1%-H2%:IF HM%<0 THEN HM%=H2%-H1%
3030 VM%=V1%-V2%:IF VM%<0 THEN VM%=V2%-V1%
3040 CNT=0
3050 CNT=CNT+1:HM%=HM%/3:VM%=VM%/3
3060 MI!=HM%^2+VM%^2
3070 IF MI!>1777 THEN GOTO 3050
3080 MI!=MI!*M(CNT):MI%=SQR(MI!)
3085 PRINT MI%;" miles"
3090 RETURN
```

The default coordinates in statement 70 are for New Orleans. The mileage calculations will be for distances from New Orleans. If you are testing this algorithm from another location, simply change the default V and H coordinates to your own location. If you do not know your own V and H coordinates, I can supply those to you if you will provide me with the area code and exchange of your telephone number (at the location of your tnc or digi, of course). Contact me by packet @ WB5BZE or call by landline. If I am not at home, leave info on answering machine and I will return info by packet. Your comments, and ideas are solicited.

- PRM -

Packet Status Register

December 1986 #24

Tucson Amateur Packet Radio Corporation

President's Corner

Lyle Johnson, WA7GXD

NOTICE!

Nominations are coming in for the TAPR Board. Please hurry if you have a candidate in mind. You may make it under the wire...

END OF NOTICE!

The past month has been an extremely interesting one for me. HAM/WEST, COMDEX, AIWA, PSK and HF have been at the forefront (pretty broad front, I suppose).

HAM/WEST

The Las Vegas convention was well attended, with perhaps 2,000 attendees. There were some last minute hitches, including the programs getting delayed at the printers and not appearing until the second day. John and Jan certainly have put a lot of effort into making HAM/WEST a success.

Packet got exposure on both days, with two forums per day. Dave Pedersen, N7BHC, spoke on Packet Basics while I covered the Advanced Topics discussions. All sessions were well attended.

I personally want to thank all of you who came by, asked questions, provided comments and generally communicated (both positive and negative topics) for your inputs at this convention, as well as all the various conventions that I attend. There is nothing more valuable to me as a TAPR officer than one-on-one feedback, and conventions provide an excellent means for this to occur. Don't hesitate to corner me the next time you see me!

COMDEX

Pete Eaton, Gwyn Reedy, Andy Freeborn and I decided to hang around Las Vegas for the big COMDEX show that took place the Monday after HAM/WEST.

And I thought Dayton was a zoo!

There were about 100,000 people (plus or minus a couple dB) registered for COMDEX. In case you don't know, COMDEX is a computer show put on by manufacturers and distributors who are looking for OEMs and dealers for their products. It isn't intended as a general public affair.

If what I saw is any barometer, the IBM PC-AT clones and 80386 machines are about to take over the world! There were only a handful of 8088-based PCs, one or two Amigas, an Apple IIGS, maybe five (5, count 'em) MacIntoshes and -- surprise -- a few dozen Atari ST machines.

The booth with the greatest excitement had to be the Atari booth. They had a prominent space, partitioned it into small exhibits which were then filled by third-party software and hardware developers who are supporting the ST series. The booths were manned by a morning group and a (slightly different) afternoon group.

And you couldn't get near it.

I had to squeeze and push and generally be, shall we say "assertive", to get into a cubicle and see what was happening.

Reminded me of the early days of packet...

Speaking of packet (funny how that subject often crops up), Hank Magnuski, KA6M, early US packet pioneer, was there exhibing his company's newest PC add-in card. It lets you send and receive Facsimile (FAX) images with standard FAX machines. Uses 9600 bps modems on a standard telephone line. Anyone out there experimenting with picture transmission via packet?

AIWA

Back in the mid '60s, I owned what was then a hi-tech device. It was shaped like a briefcase, but, when you opened the cover, it was a 7-inch reel-to-reel tape recorder. If it had a white case, it was a two-track machine; black cases held a four-track unit. This battery-powered portable tape recorder was made by AIWA, a Japanese audio firm.

Earlier this year, AIWA entered into the TAPR TNC 2 OEM Agreement and began development of an Amateur packet controller.

The week of November 17th, the TAPR office was visited by three gentlemen from AIWA. They bore a prototype of the new AIWA APX-25 Packet Controller (see photo). If I had to use a single word to describe their product, it would have to be a very colliqual "slick," so I won't.

The unit looks like a piece of stereo equipment, down to the sculpted grey front panel with drop-down

Continued >>>

door. Under the door are the DIPswitches for setting baud rates on the serial and radio ports, a self-test switch for invoking audio loopback (with front-panel LED announcing that loop-back operation is in effect) and a switch for selecting the internal or an external modem.

And, when you select 300 or 1200 baud, the internal modem automatically reconfigures for Bell 103 or 202 tones.

Even the POWER switch is on the front panel!

The modem is built around the AMD 7911 "World Chip" IC (this is a variant of the 7910 chip used by Kantronics, PackeTerm and others).

There are two rather interesting additional features of the APX-25.

The first is a built-in speaker connected to the line. It allows you to monitor the packet channel aurally (a very good idea). And there is a soft chime that is activated when a station connects to you. Not a racous alarm, but a gentle tone. Of course, the speaker/chime is enabled or disabled by one of the DIPswitches behind the little drop-front door.

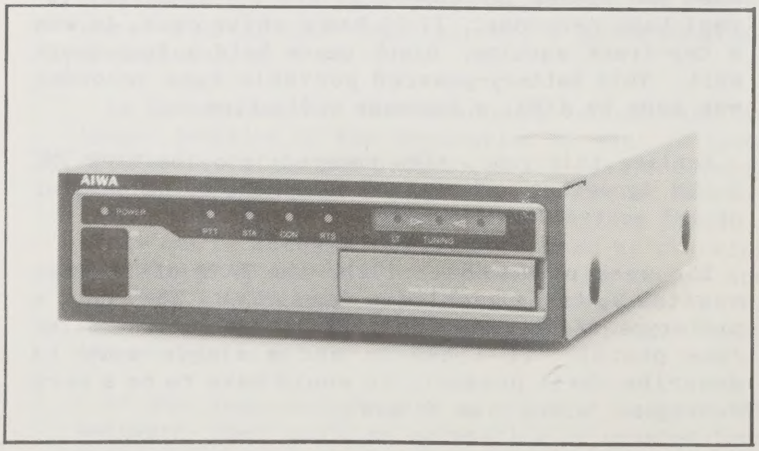
The second feature is an HF tuning aid. This is a three-LED display that, with a few minutes practice, enables you to tune to within about 30 Hz of another HF packet station's signal. Not bad.

The back panel of the APX-25 is clean. There is the AC power cord (this unit isn't designed to operate from a DC source), a DB-25S RS232 serial port connector, a radio connector, and...

There is a separate set of mic and spkr jacks especially designed to interface to handie-talkies and an external modem connector (with all the right signals for interfacing to an external modem, such as the TAPR PSK modem now under development for use on FUJI - FO12).

All in all, the APX-25 is a class act.

For the time being, AIWA will only be marketing these units in Japan, but if you happen to be in Akihabara next month...



PSK MODEM

The TAPR PSK Modem project is moving along. As may be expected, the schedule has slipped a bit, but a review of the redrafted schematic was held in Tucson in early November, and board layout is taking place as this is being written. With a bit of luck (don't count on it, says the voice of experience) we should be testing some "alpha" units during the Christmas holidays. If they work, "Beta" testing will immediately follow. That targets an initial release perhaps as soon as early February.

Tom Clark, W3IWI, has been doing a terrific job of testing a prototype unit and has successfully copied packet-formatted telemetry from FUJI, as well as conducting terrestrial point-to-point testing. The weak-signal performance of this modem design appears to be very good.

This project has many of us very excited. Stay tuned!

HF

It seems that I have been writing a lot about HF packet recently. This is simply because, to me, HF is where packet is like traditional Amateur radio, as opposed to VHF operation, which is (often) more like using a telephone modem to a data base.

Don't get me wrong. I almost depend on VHF packet. The "local" PBBS is W1FJI. 'FJI is in Phoenix, about 120 miles from my home in the south end of Tucson. Unlike many of you, this local PBBS is "0" digipeat hops away.

Here in Arizona, and especially in Tucson, we do things differently. We're heretics, I guess.

Rather than put up a wide area digipeater (with the attendant problems of hidden terminals, needing to go to dual-porting, poor throughput, etc.), we put up a full-duplex repeater. It is located on a mountain peak at around 9,000 feet, and has a radius of coverage of about 140 miles.

With this system, everyone can hear everyone else pretty well, so retries are minimized. And since the repeater is in such a good location, it is useful for voice or packet emergency communications. Voice where spelling isn't important, packet where message accuracy is. We just use a 30 second timer on the machine to discourage voice use, and have the frequency coordinated as a packet channel. Simple, and it works well.

Of course, a digi is planned for co-location, so we can be ready for multiport NNCs when they become available. And of course, so we can have fun with retries, collisions, hidden temrinals and...

But, as I was saying, HF is more like traditional Amateur radio. You make a QSO, you actually QSY (funny, the radios still have tuning knobs!), you chat with someone you will probably never see, maybe work some DX, and in general have a lot of fun.

Eric, N7CL, has been doing lots of testing with various TNCs and modems. In this issue of PSR, he

Continued >>>

Beginner's Corner:

Proper VHF Radio Interfacing Techniques

Eric Gustafson, N7CL

Since about 1982 I have been helping new packet stations get on the air here in the Tucson area. This has revealed 2 major problem areas for the newcomer who is putting a packet station on VHF narrow band FM. These are:

1. Excessive deviation resulting from overdriving the radio microphone input stage.

2. TNC timing parameter settings which are incompatible with the transmit/receive changeover delay time of the radio being used. Also, settings which are incompatible with the DWAIT, RESPTIME or FRACK settings in use by the other users of the packet channel.

Since there is usually plenty of help available on the air for TNC parameter setting problems, I will restrict myself to the radio interface problem here.

Lately I have been answering a lot of questions like "Gee, I can copy Jim FB on phone but not on packet...why is that?"

I have also noticed that almost every single newcomer I hear is grossly overdriving his microphone input. I thought this was just a lack of sophistication on the part of the new packeteers until I went to Dayton this year (1986).

At Dayton I had the unique opportunity to use a communications analyzer to observe signals from most of the manufacturers in the packet radio business. In one two hour period, I copied 16 different callsigns. These included my own and those of all the manufacturers who had stations on the air at the show. Only one of those signals (mine) had the deviation set anywhere near the proper levels for packet operation. In fact all but 2 were actually sending square wave tones! All of these signals were overdriving the microphone input stage enough to cause the modulating tones to be distorted by the deviation limiter in the transmitter.

Since even the manufacturers apparently don't know how to interface their packet equipment to radios, I am not surprised that few of the users do!

I have written this to provide some help to newcomers to packet radio in the area of getting their new packet gear interfaced properly to their VHF narrowband FM radios.

As currently configured in the TAPR TNC and clones, modem output levels are much too high for driving microphone inputs. This is so severe that in most cases the level control in the TNC cannot be set to a nonzero level which will not overdrive the microphone amplifier stages. This was done (I believe) to allow directly driving high level 600 ohm auxiliary tone inputs or audio distribution networks. This is fine, but it doesn't represent the situation for the vast majority of packet users. Also, not enough information is presented to warn a new user that this is the case.

So, what is a reasonable deviation level to use for packet? And how does one cure this problem?

To answer the first question I must digress a bit and talk a little about one of the characteristics of NBFM. Don't panic, I'm not going to get carried away with a lot of FM theory. There are plenty of sources of information on the mode starting with the Radio Amateur's Handbook if you want to understand all the technical details.

If you have been on VHF FM for any length of time, you will have noticed that as a signal fades into the noise there are actually 2 noticeable thresholds that are crossed.

The first is the transition from absolutely no noise to a slight hiss in the background. This is the point at which the minimun amplitude excursions of the signal are no longer above the limiting threshold of the receiver. Generally, the signal is still perfectly readable (and copyable on packet) until the second threshold is reached. As the signal level falls toward the second threshold, the hiss gets a little louder but remains just a background hiss.

The second threshold is the onset of a pulse type noise or "popping" sound. This is the point at which the phase demodulator in the receiver can no longer follow the carrier frequency correctly 100% of the time. Every time the demodulator loses track of the carrier, you hear a pop in the receiver audio output. I call this "popcorn" noise. The popcorn noise threshold is the limit for copying packets. Below this threshold the AFSK demodulator (anyone's) cannot recover error-free data. However, because of the powerful signal processing algorithms used by the brain, these noise pulses are only a minor irritation to the human ear. This is usually why Jim is readable on voice but not packet.

Why all this stuff about noise thresholds?

Well, it is because the popcorn noise threshold varies when there is modulation present on the carrier. In general, the more deviation, the more signal level required to get above this threshold.

Continued >>>

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is starting a two-part (may stretch to three, we'll see) series on interfacing a radio and a TNC, then report on his "denominator" modem and describe some of the steps necessary for truly effective HF packet operation. Along the way, he will be reporting on the relative performance of several HF modem products (AEA PM-1 and PK-232, Kantronics KPC-2400 and UTU-XT, TNC 2 clone).

I think you may find the results rather surprising.

I did!

Happy packeting!

- PRM -

This effect is small with low values of deviation but increases dramatically above about 3 kHz deviation. In the commercially available NBFM transceivers that I have had a chance to measure, it appears to be an increase of about 5 dB when going from 3 kHz to 5 kHz deviation (assuming a properly preemphasized signal).

You can get carried away with running reduced deviation, however, and too little deviation can cause problems too. This is because the signal-to-noise ratio presented to the AFSK demodulator in the TNC is degraded as the tone level approaches the hiss noise (remember the first threshold?) level present at the receiver output. You aren't in much danger from this effect unless you are running significantly less than 2 kHz peak deviation.

The answer (finally) is to take steps to assure that you are running somewhere between 2 and 3 kHz deviation. If you are measuring deviation while modulating with a single tone, use the high (2200 Hz) tone.

The cure for the excessively high modulator output level is simply to put a resistor in series with the AFSK audio output of the TNC. I have been using this method with great success. A capacitor can be used in conjuncton with the resistor to correct the audio response of those transcievers which do not properly preemphasize the modulating audio.

I like to set the TNC audio output level to about 200 millivolts peak to peak and then select a series resistor which will assure proper drive to the radio microphone stages with this (200 mV) output level. The best place for this resistor is inside the radio between the digital audio interface connector (So? Add one to the radio!) and the microphone input stage. Alternatively, it can be placed inside the microphone connector used to bring packet AFSK tones into the radio.

Using a series resistor in this manner has the advantage of not requiring the TNC output level to be readjusted for each of several radios I use for packet. I can freely interchange TNCs and radios without having to worry about making any audio level adjustments.

It would be nice if the radio manufacturers would standardize on a reasonable external tone input level so that radio modems could all be designed for an output level that would result in proper radio operation (yes, this all applies equally well to RTTY AFSK tone data too!). I would like to take this opportunity to vote for 200 millivolts peak-to-peak! But, alas, until then the poor user will have to take steps to insure that his particular device is working properly with his particular radio. Unfortunately, in the case of NBFM transceivers this usually requires access to test equipment not readily available to the average amateur.

If you are indeed an average amateur and don't happen to have a communications analyzer laying around the shack, don't despair. There are a couple of methods you can use to at least get in the ballpark without all the fancy test equipment. The first (and best) way is to identify someone in your local area who has had his packet station correctly adjusted using the proper equipment. Then, by monitoring your signal and his signal on an independent receiver, you can adjust the level of the AFSK tones from your TNC to minimize the difference. This is facilitated by connecting to yourself through the station you are using as a deviation standard. Then every time you send yourself a packet, you will hear your signal first and his signal second on the receiver you are monitoring with. You can adjust your deviation until your signal sounds like his, or you can use an objective comparison like an oscilloscope or audio voltmeter on the monitor receiver output to make the comparison. Be sure to carry out this test on a simplex channel as a repeater may give you a false idea of the deviation present on the reference signal.

The second method also involves using a second receiver but is potentially much less accurate. It will, however, be better than overdriving your microphone input stages. This method assumes that the transmitter you are adjusting is operating properly and is equipped with a deviation limiter which is set to near 5 kHz of deviation (this is true of most commercially available 2 meter amateur equipment). Do NOT use this method on a Regency HR-2 series transceiver!

The procedure is quite simple.

Just plug a 10 ohm resistor into the external speaker jack on the monitoring receiver (check your radio for audio ground reference. Several FT208R speakers bit the dust during TAPR's Beta TNC project by using 10 ohm resistors referenced to negative DC ground!). You will be measuring the audio voltage produced across this resistor with an A.C. voltmeter. The A.C. volt scale on most modern multimeters will be fine for this measurement.

Connect your packet transmitter to a dummy load. Then, while sending the high tone in calibrate mode, adjust the audio level from the TNC from minimum upwards until you find the point at which the monitoring receiver audio output voltage no longer increases in proportion to an increase in the TNC output level. Be sure that the monitoring receiver volume control is set to a point where the receiver audio amplifier is not distorting. Most receiver output stages can produce 2 volts R.M.S. without excessive distortion.

Now, without touching the volume control on the monitoring receiver, adjust the AFSK audio level from the TNC until the voltmeter reads 1/2 of the previous reading. This should put you in the 2.5 kHz deviation ballpark.

That's all there is to it!

- PRM -

PSX — Packet Software Exchange

IBM-PC and MS-DOS

PAK/UNPAK $5 postpaid

This is a program for sending binary files between computers. Submitted by KA9AKM.

Behind The Scenes

Lyle Johnson, WA7GXD

The new TAPR Packet Video was released this summer and it has been very well received by the Amateur packet community. Over 100 copies have been distributed by TAPR alone, not to mention the many tapes that have been "cloned" from purchased copies.

(And, yes, you are welcome to copy the video so long as you don't sell the copy!)

Ever tried to make a home movie? If so, you can appreciate the kind of work that went into this production.

The actual taping of "Packet Radio" only took one evening (Pete, the "talking head," had it easy!); from taping to final duplication of the tape took well over a month! (Of course, the taping had to be squeezed in between the 10 P.M. News and the night shift who needed the gear for station business.)

THE VOLUNTEERS

Four Amateurs, who are professionals in the TV broadcasting industry, spent that month making the final product look first class.

Jim Wellinghoff, K0SBH, was the Producer and Director of "Packet Radio." Gil Ludwig, WA0YCY, was the Technical Director. Kent Lissa, WB0ODX, handled the Audio while Phil Grason, WB0TBH, did the Electronic Graphics.

Jim coordinated the whole affair, and ensured that it was done in a competent and professional manner.

GRAPHICS

All the graphics (and slides) were digitized in a computer! Phil spent hours digitizing crude sketches and sloppy, handmade slides into professional graphics. The action scenes (the bouncing ball leaping from antenna to antenna) was a trick, too! It looks easy when you see it, but doing it (and getting it to go the right direction when you want it to) is another! All this work had to be double checked, tweeked and them "still stored" into memory.

Think we're finished? Not by a long shot! The next trick was to get these graphic images superimposed on the talking head at the right time! No simple feat, first the video levels had to be matched (using some oscilloscopes that would make you drool), then the 1 inch master tape was run back-and-forth to get the EXACT spot to "splice" the graphics in.

Sound simple? Try it some time!

PUTTING IT ALL TOGETHER

In the master control room, Gil oversaw the "melting" of the images, fading of the slide scenes, etc. This was accomplished using an array of panels that look like they belong on the Bridge of the starship "Enterprise."

Since the equipment to do all this is scattered throughout several rooms, communication had to be done via intercom and remote screens. Queues did not alway work right the first time (or the second), and sometimes it got real frustrating, but Jim, Gil, Phil and Kent kept their cool through it all.

KSDK (Channel 5), the St. Louis NBC affiliate station where the work was done was most generous with the use of their facility. Gil, Jim, Phil and Kent enthusiastically donated their time (all after hours, sometimes real late and on weekends) to put "Packet Radio" together.

From the first outline of the Script to "in the can," Jim, K0SBH, had a can-do attitude as Director. He coordinated the use of the studio with the station, and pulled the rest of the talented crew together to pull the whole thing off.

GETTING IT TO YOU

Once the master tape was made, we needed to find a means of duplicating the VHS cassettes en masse, and at low cost. Enter Mike Phillips, WB6RHW, Staff Manager AT&T, Aurora, CO, who arranged the professional duplicating facilities and cranked out nearly 200 VHS copies of this production for TAPR to distribute!

TAPR is fortunate to have folks that are willing to donate this kind of time to a common goal. The unfortunate part is that they seldom get the recognition they deserve. Next time you watch the tape, play close attention to the credits at the end; there you will find the real artists that put the new "Packet Radio" video tape together.

"Packet Radio" is available from the TAPR office for $10 postpaid. See the ptice list elsewhere in this PSR for ordering information.

- PRM -

Renewal Reminder

Please check your mailing label on the front cover of this issue of PRM. If you are a TAPR member, the label will look something like this:

WA7GXD Exp: 02-87
Lyle Johnson
5971 S. Aldorn Dr.
Tucson, AZ 85706

If you have no Amateur call in our records, the callsign part of the address label will be blank.

If this issue of PRM is your last, your label will proclaim that fact, as in the following example:

WA7GXD Exp: 12-86 LAST ISSUE!
Lyle Johnson
5971 S. Aldorn Dr.
Tucson, AZ 85706

Continued on page 14

HF Modem Performance

Eric Gustafson, N7CL

There has been much discussion about the performance of modems, specifically demodulators, for use at 300 baud on the high frequency amateur bands. Most of the performance claims that have reached me have been anecdotal in nature. There is a very good reason for this. Modem performance under the conditions experienced on the typical H.F. amateur band is extremely difficult to accurately quantify by laboratory measurement. This is due to the large number of variables (noise of various kinds, multipath, QRM, tuning error, etc.) that would have to be accounted for to make a meaningful measurement. This coupled with the expense of the equipment required to do the bit error rate testing places this kind of measurement out of the range of the average amateur. Fortunately, the average amateur isn't particularly interested in an absolute quantitative measurement anyhow. What he IS interested in is which of the several types of commercially available modems works best at HIS (or HER) shack on HIS radio hooked up to HIS antenna in HIS neighborhood noise environment. For this he only needs a means to make a valid RELATIVE performance measurement.

To facilitate this type of measurement I have been doing some work on H.F. with a version of the familiar XR2211 demodulator. This is a slightly improved version of the demodulator found in all of the TAPR TNCs and clones. In fact, the testing I have been doing on the air has been done on a modified TNC-2 clone. The schematic diagram of the "reference" demodulator is shown.

The test methodology is very simple. (Ten paces, turn and fire!) Two TNCs, one with the "reference" demodulator are fed the same audio from the same radio at the same time. Each TNC is hooked to its own computer which has an open buffer to store all the data monitored by the TNC. When the largest buffer reaches a reasonable size (15 to 20k), the test run is terminated and the buffer sizes are compared. By simply dividing the number of characters captured by the demodulator under investigation by the number of characters captured by the "reference" demodulator, a number representing a kind of "figure of merit" is obtained for the target demodulator. It is for this reason that I like to call the "reference" demodulator the DENOMINATOR demodulator.

All the test equipment needed to do this type of comparison is readily available to the average packeteer who has a packeteer friend who is willing to uproot his TNC and computer for this purpose.

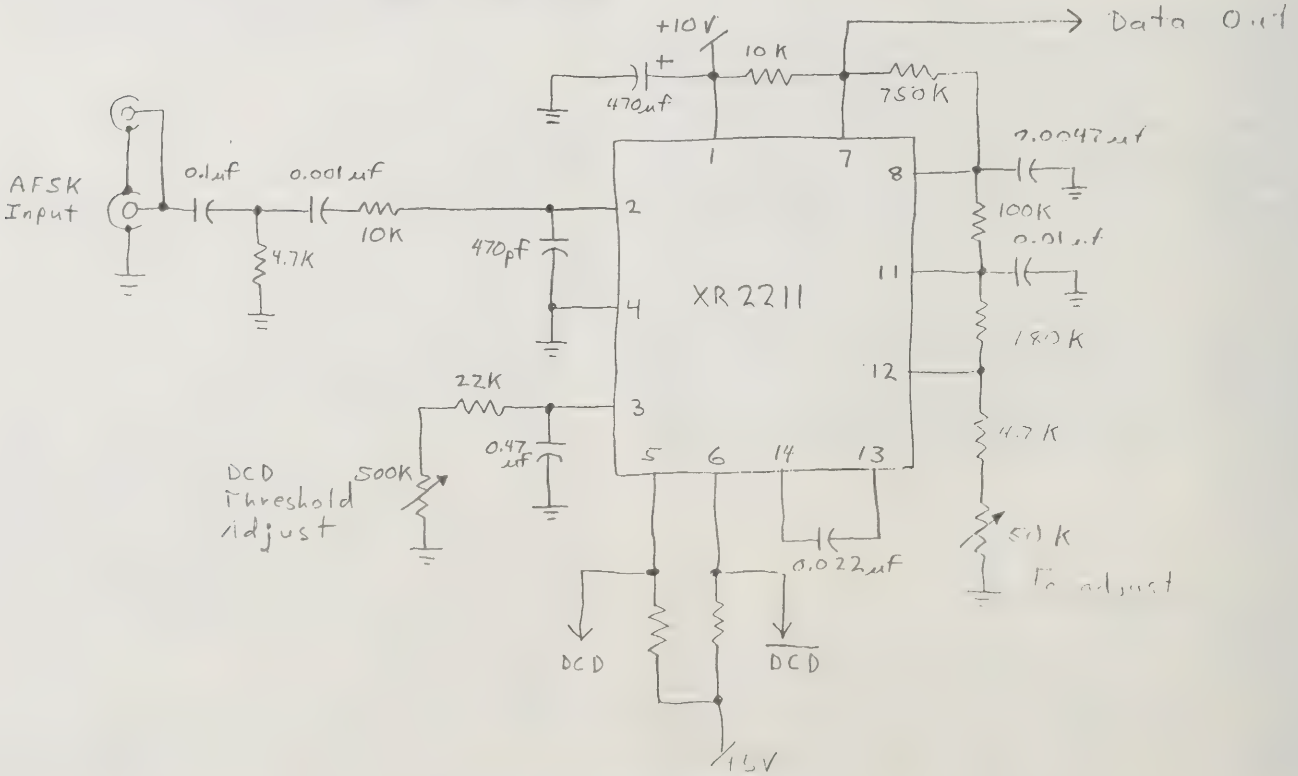
I will be writing about the results of testing several different types of demodulators under the conditions present at MY shack in a future issue. I will also be looking forward to results reported by others who are interested enough to duplicate this type of comparison.

Watch this space...

73 de Eric, N7CL

- PRM -

XR2211 AFSK Demodulator for 300 Bauds, 200 Hz Shift



TAPR Annual Meeting

Tucson Amateur Packet Radio will be holding its annual meeting during the weekend of February 21 and 22, 1987.

Your Board of Directors plans to meet all day on Friday, the 20th.

Friday night activites will include the traditonal Pizza gathering, followed by racing at the Malibu Grand Prix.

Saturday, the Theatre Royale at the Embassy Suites Airport Inn (formerly Granada Royale) is reserved from 9 AM through 5 PM. The day's activities will include presentations from packeteers from various areas on numerous subjects. As in previous years, a catered lunch will be served.

Saturday night, we will gather at the Triple-C Chuckwagon Ranch for an old-fashioned western meal and entertainment.

Sunday morning the Theatre Royale is again reserved from 9 AM until 1 PM. This is to allow more and better presentations during the meeting.

The early afternoon adjournment should provide ample time for folks to drive home or catch a plane from Tucson International Airport.

More details will be published as the big weekend approaches. If you want to speak, please write to the TAPR office and let us know so we can begin planning early.

See you in February!

NOTE: Since the Board will meet on Friday, all voting must be done by mail. No ballots will be accepted at the annual meeting, so those of you accustomed to procrastinating until then will be find yourselves disenfranchised! Please vote in a timely manner, using the ballot that will be found in your January PSR.

- PRM -

New TNC-2 Software

Howie Goldstein, N2WX, is at it again! He has prepared a new release of software for the TNC 2 to utilize the new 32k byte RAM chips. This results in bigger buffers.

The price of the new CMOS RAMs has dropped from $120 last year to $20 today!

TAPR has the new chips in stock and expects to have the 1.1.4 software release available for shipment this month. As this is written, the software is being tested, and it is looking good!

See the price list in this PSR section for details.

- PRM -

TAPR Price List

The following price list is current for December, 1986.

Memberships (including renewals):

Associate (no PSR/PRM)
$5.00/year
Full (PSR/PRM included)
$15.00/year in the US
$18.00/year in Canada
$25.00/year elsewhere

Accessories:

HF Tuning Indicator Kit
$25.00 postpaid in the US
(see October 1985 PSR for circuit)
FUJI/OSCAR 12 PSK Modem
To Be Announced
9600 baud Modem Semi-Kit *
$25.00 postpaid in the US
(see K9NG article in 4th ARRL Proceedings)
N2WX FADPAD Xerox 820 Adapter *
$25.00 postpaid in the US
(PC board and data only)
LSC-10 Coffee Mug
$5.00 (only at Hamfests!)
(and the Annual Meeting...)

* These products are for experimenters and are neither complete nor supported by TAPR.

Education:

Introduction to Packet Video
$10.00 postpaid in the US
(available in VHS format only)

TNC 2 Software/Hardware:

TNC 2 Software Upgrades
1.1.3 uses 16k RAM
1.1.4 requires 32k RAM chip(currentlyin testing)

$12 postpaid
Reprogram your EPROM
$2 plus postapid return mailer
32k byte RAM chip, low power, 150 nSec
$20 postpaid

OEM Packages:

TNC 1 OEM package
$500 one-time charge
TNC 2 OEM package
$5,000 one-time charge plus royalties

In addition, we stock spare parts for TNC 1 and TNC 2 units. Call or write for your specific requirements.

***TNC 1 owners - we again have the WD1935 and XD2212 ICs in stock.

- PRM -

NOMINATIONS ARE STILL OPEN (but just barely)...

It is that time of year again. Now that your TV screen is clear of the usual mud-slinging, acrimonious poltical advertising, it is time to consider something really important. I am referring to your TAPR Board of Directors.

As you probably know (but some of you newer members may not), TAPR is governed by a fifteen-member (15 -count 'em! That's more than General Motors!) Board of Directors. Each Director serves a term of three (3) years, and, due to staggered terms, one-third of the Board, or five (5) Directors, are elected every year.

The current Directors' terms expire as follows:

Mike Brock, WB6HHV		Feb 1988
Tom Clark, W3IWI	*	Feb 1987
Pete Eaton, WB9FLW	*	Feb 1987
Andy Freeborn, N0CCZ		Feb 1988
Steve Goode, K9NG		Feb 1989
Eric Gustafson, N7CL		Feb 1989
Skip Hansen, WB6YMH		Feb 1988
Lyle Johnson, WA7GXD		Feb 1989
Scott Loftesness, W3VS		Feb 1989
Dan Morrison, KV7B		Feb 1988
Margaret Morrison, KV7D	*	Feb 1987
Harold Price, NK6K	*	Feb 1987
Bill Reed, WD0ETZ		Feb 1988
Gwyn Reedy, W1BEL		Feb 1989
Pat Snyder, WA0TTW	*	Feb 1987

Any member of TAPR may nominate any member for the Board.

To place a name in nomination, just send a letter to the TAPR office with the name of the person you wish to nominate (including yourself, if you like). It would be helpful if you would also provide us with your nominees telephone number and any qualifications you think your nominee has for the office.

We will then get in touch with him (or her) and obtain the person's direct consent to run. At that time we will ask for a statement from the nominee for publication in PSR. (We won't print your picture, so don't let that stop you!)

"What is required of a Director?" you ask.

A Director is expected to attend the Board of Director's meeting and TAPR Annual Meeting in February of every year in which he (or she) holds office. The meetings are held in Tucson, and TAPR does not reimburse expenses for this trip. This means, depending on where you live, a commitment of a few hundred dollars per year.

The Board of Directors reviews the previous year, establishes goals, elects the Officers, and generally guides the organization.

Deadline for Nominations	December 15th, 1986
List of candidates and ballot	January 1987

So, submit the name of someone you think will do a good job and get it in to the TAPR office today!

- PRM -

Job Opening At TAPR

One of the signs of a healthy organization is the injection of new blood into the leadership of a group. TAPR, like any other collection of folks, needs new people and ideas to stay successful.

I made it known to the TAPR BoD this last summer that I would not seek relection as an Officer. Since becoming involved with TAPR in the Fall of 1981 I've had a great time, but it is time for others to take the helm. Make no mistake, the whole experience has been rewarding. Hopefully, someone from the group will come forward. If you thrive on challenges and want to make a contribution to our hobby, please let the TAPR Board of Directors know of your interest.

As for myself I hope to stay involved by working on new projects. I've made a lot of very close friends over the last 5 years. It will be interesting to see what happens in Packet Radio during the next half-a-decade!

See you on the Network! Pete, WB9FLW

- PRM -

NEW OFFICE HOURS

The TAPR Office is once again open four days a week.

Office Manager Cris Kurz has decided her new daughter can be entrusted to her mother for a few hours a day (aren't grandparents wonderful?), and is now back to work.

Office hours are Tuesday through Friday, 8 AM until 4:30 PM Mountain Standard Time.

The best time for 'phone calls is after 1 PM.

NOTE: If you watch TV, Mountain Time is the one they never mention...

- PRM -

RENEWAL continued from page 11

In the old days, we would still send you an issue or two of PSR and hope you noticed you had expired. Nowadays, membership services are subsidized (which means we charge too little!), and PRM is a lot more expensive to publish than PSR, so we won't send any extra issues your way.

We are getting a program going to send you a reminder postcard, but that hasn't been completed yet.

If your membership is due to expire, please renew now. It only takes us a day or two to get your renewal processed, but we can't process it if you don't send it!

- PRM -

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

Write Only Memory

By Ted Huf, K4NTA

Congratulations to all the winners (and losers) in the resent FADCA Board of Directors election. The results are printed in this section of PRM. I want to thank those who voted for me.

I am asked from time to time what is going on with 220 MHz linking. There was much talk about it earlier this year, but it might seem that not much has happened. Work is going on though but without a lot of fanfare. In the Broward County area, K4GFG and others are working on a dual port digipeater that will use high gain, highly directional beams pointed towards Naples on the West Coast and provide a link into 220 MHz.

In Lake Wales, groups from Tampa and Orlando have reactivated LKW on 145.01 and are working on the 220 MHz part of the system. I am not sure if it will operate as a dual port digipeater or a GATOR 2 Switch.

Howie, N2WX is working on a new improved version of the GATOR 2 Switch or pad that will support two ports, one say on two meters and one on 220 MHz.

I know that there are other groups around the state working on various linking projects but I will not go on here. Work is quietly being done.

Since last summer, I have operated my BBS on 145.01 and 145.03. All the BBSs South of Stuart moved over to 145.03 last summer in order to relieve some of the QRM on 145.01 in the heavily populated area of South Florida. My function was to interface between 03 and 01 for the rest of the Florida BBSs which are still on 145.01.

We have two stations in Florida, K4TKU and K0KBY, both in Miami, who do a fine job relaying messages to and from the "Big Local Area Network" on 20 meters. Joe, WD4KAV, has agreed to take over the 145.03/145.01 interface duties for me and I will move back to HF with one port of my BBS. Since K4TKU and K0KBY are doing so well on 20 meters, and since there are enough BBSs on 20, I have decided to operate on 7093 or 10.149, perhaps both.

I think that having a forwarding BBS here on 40 or 30 meters will help out on the short haul messages through out the South East.

The only thing holding us up right now is the lack of a two meter radio for Joe to use. It is hoped that we will come up with one soon.

Until next time, best of season greetings to all of you and happy packeting.

- PRM -

What Makes A Packet Network

Gwyn Reedy, W1BEL
FADCA President

Some local networking discussions have really sparked my interest and so I want to write in the FADCA>BEACON this month about this topic. Let me start by reprinting several BBS messages that have appeared recently. Some editing has been done to save space, but the ideas and opinions remain unalterd.

BBS Messages

Msg#	TR	Size	To	From	@ BBS	Date
510	QN	839	ALL	WA4GPF	ORLBBS	861125

The following is my opinion; how do you feel on this important subject?

* 220 Linking - Accessing the network *

The network may be thought of as a long distance line. On 220, all major digipeaters in the state will be linked together via new 9600 baud modems. All users, including BBS systems, should access the the 220 network via 2 meter ports on their local LAN digi; NO users should access the 220 network directly on 220. Few if any users have the antenna height of the good digi; such a station transmitting directly on 220 can only degrade the performance of the network.

Msg#	TR	Size	To	From	@ BBS	Date
1638	F	4119	ALL	K4AHO	ORLBBS	861203

Recently Chuck Harrington, WA4GPF, started a survey to solicit opinions on whether users, including BBS'S, should be allowed on the 220 MHZ Backbone system. This question and the responses it generated indicate a state of confusion concerning networking in Florida. Lumping the individual users together with BBS'S does a disservice to to the existing network system. The many WORLI BBS'S in Florida are network servers (ie. serves many by forwarding and storing mail) and are intregal parts of the network system.

In the past, users of the 145.01 MHZ network system have complained the BBS'S have unfairly QRM'ed the channel making it useless for keyboard communications and have asked the BBS sysops to construct their own network (off .01) for forwarding. The Florida STAR is an outgrowth of that request but will be shared among all users. The forwarding of the BBS'S will be made as fast and transparent to the individual network user as possible. This will be accomplished by allowing the BBS direct access to the 220 MHZ Backbone system. The BBS'S will forward directly thru the main 220 MHZ digipeator if possible, or around the perimeter of the STAR. If this is impossible then the BBS'S

Continued >>>

will forward by using the 220 MHZ port of the local Dual-Port Switch, avoiding loading the 2 meter LAN frequency. The BBS secondary port will be accessable to local users on the LAN frequency. Accessing the 220 MHZ system thru the LAN 2 meter port will be considered the last resort because of the additional QRM to local LAN users. The BBS'S by accessing the 220 MHZ backbone directly and forwarding continously will have a low average channel usage and a minimum effect on individuals using the backbone thru the 2 meter port. When the backbone is upgraded to 9600 baud the BBS traffic will become completely transparent.

There has been much talk about a "Hidden Terminal" problem. A "Hidden Terminal" in amateur packet radio circles is a user with a HT and minimal antenna which cannot hear any other user except the local digipeator. His packet have a strong likelyhood of continously "crashing" with packets of other users, thereby swamping the network and greatly decreasing the rate of data transfer. That is why individual users are asked to use the 220 MHZ system thru the 2 meter LAN port. The dual-port switch will acknowledge his packets and hold them until the 220 MHZ backbone can accomodate them. Also the individual will not need an additional radio and antenna on 220 MHZ to take advantage of backbone. The BBS'S (to avoid the hidden terminal problem) will need to have a station capable of hearing at least two other dual-ports to use the backbone directly. Otherwise the BBS should connect to and forward thru the LAN dual-port switch on the 220 MHZ side. Again this approach minimizes QRM to local users on 2 meters.

The consensus developed at the November 1st. North Florida Network Committee meeting held in Ocala supported the continuation of an uncoordinated network on 145.01 MHZ primarily for keyboard communications, as well as a user transparent 220 MHZ backbone system.

```
Msg# TR  Size To     From   @ BBS  Date
1602 PY  1253 W1BEL  WA4GPF ORLBBS 861130
```

I feel that we have a big problem with present efforts to begin 220 linking......

I take great exception to the plans of some BBS operators to Transmit directly on the 220 backbone, and all but two responses of my "What is your Opinion" survey have thus far agreed with me. FADCA must provide leadership and direction, or surely 220 Networking with falter.

```
Msg# TR  Size To     From   @ BBS  Date
563 BN   748 GRIPE  N4HAP  SRQBBS 861204
```

Comments:

It seems to me that I have been hearing more and more complaints about the operation of BBS's on 145.01 MHz. I wonder if anyone ever complained about 2 meter repeaters being a source of QRM for those who wanted to work simplex on that particular frequency. It seems to me that the operators who wanted to work simplex on packet could move to another frequency just as easily as asking the BBS's to change. The purpose of a BBS is to serve as a message center for traffic and mail. The question of "which one is more important? Traffic or ragchew." is a moot point. In my opinion the individual operator can change frequencies more easily than BBS's. The opinions exclaimed herein are only the opinions of N4HAP.

End BBS Messages

I agree with Jim, K4AHO, that networking is misunderstood. However, there are many different activities that fall under the name of networking, so one man's view of the situation may be another man's misunderstanding. Here, for what it is worth in layman's terms, are my comments about FADCA's network plans.

First, some homespun philosophy. Decide where you want to go, then decide how to get there. That is to say, don't let the destination be determined by chance or the course of least resistance. If you find that you cannot readily get to your destination, deviate from the best route in favor of a practical route, and accept some delays, BUT NEVER LOSE SIGHT OF THE DESTINATION! I believe the way to do this is to define and agree to an ideal networking goal and whenever compromises are required in the actual implementation, acknowledge them as such. When we hang a 'compromise' label on something it should serve as a flag meaning 'temporary - evaluate regularly for improvement.' Then we will not let ourselves believe later that the detour was really the desired path.

The "destination" or goal for our network should be a system that will [move digital data of any nature] [in a rapid fashion] [to any desired location] [in a transparent] and [reliable manner]. Those bracketed phrases define the elements of the network: Flexibility, Speed, Coverage, Convenience, Reliability. It is not possible to put upper limits on these elements - one can use all of each element that is available. Often, however, one element conflicts with another, and tradeoffs between the elements have to be made. All of the elements have to be traded off against cost, both individually and collectively.

Example: We have been wanting a 9600 baud backbone network for years, but the modem/radio technology has been slow to become available. Since we don't have the bandwidth or connectivity to make all of our connections on a real time basis, we have adopted the RLI BBS as a non-real time networking tool. However, we have not (I hope) decided that non-real time electronic mail (E-Mail) is the main or only purpose of our network building. It was a detour on the way to an ideal network where sufficient bandwidth exists for real time connections. The E-Mail has proven to be very useful and will remain useful for those conditions/situations where non-real time communication is preferable or when support for real time communication fails.

Example: Again in regard to a high-speed network, after long delays we have realized that it is more useful to build a backbone network with whatever speed equipment is available (even 1200 bauds) than

Continued >>>

to wait for the faster gear to become available. Of course, no one will argue with upgrading the speed when it is practical to do so.

In the follwing discussion I will refer to Bulleitn Board Systems (BBSs) as the above messages do. Hank, WORLI may take umbrage at that term; He called his software a MailBox system. So are BBSs users of the network or part of the network? The only answer is both. They are a network of E-Mail servers that will be users of the backbone network connectivity. Because of the power of their services and the volume of their traffic, they may receive some special treatment by the network, and may suffer some restrictions not required of human users. This same condition will apply to other automated servers, and the higher layer protocols being debated for network control have provisions for fairly apportioning network resources.

How should BBSs be treated during the infantile stages of network implementation? They should be set up to use the minimum bandwidth necessary to effectively perform their function. This means, ideally, that they operate a user access port on a segregated local channel, and access the network indirectly with the other port for traffic forwarding. Also in the ideal case, non-BBS users access the network from a different local frequency, and purely local digipeating should be supported on yet another frequency. (If equipment considerations allow, the local channels may all have network access and there may be multiple BBS and local channels, etc.)

The above term 'indirectly' referring to BBS network access means a private link frequency from the BBS forwarding port to the network node. This will be expensive in equipment and may not be possible at first. Two alternatives exist: 1) Put the BBS forwarding port directly on the network frequency, or 2) have the BBS be accessed by users and also do its linking to the network for forwarding on the same frequency (not the network frequency).

The problems with solution 1 (BBS directly on network) are that BBS equipment needs to be located near the SYSOP since it requires much human interaction, and network nodes need to be in good RF locations. Usually the two locations are not the same. This is where the local terminal problem comes in (and I believe Jim greatly understated the problem.) If the BBS has a port on the network frequency to attach to the network, it will very likely interfere with operation of the network. It cannot hear as well as the network node, so will transmit on top of weak signals from a distant node. Likewise, the distant node will not be able to hear the signal from the less powerful BBS antenna and will collide with BBS transmissions to the node. In both instances network performance will suffer.

Solution 2 (BBS access and forwarding on the same frequency) reduces the responsiveness of the BBS to local users somewhat, but that is still a big improvement from the present situation where everything (BBS access and forwarding, and all local digipeating) is done on the same frequency.

To summarize an article that is getting too long: The network goal to provide flexible, fast, convenient, and reliable coverage over a widespread area can be best achieved by having only dedicated special purpose network node stations on the network frequency, with multiple network entry points in each local area. These multiple local frequencies can segregate normally incompatible network uses [BBS access, human to human QSOs, and machine to machine (binary files, digital video, etc.)] There is no need to segregate these uses on the network itself.

If we cannot establish such an ideal network initially, at least we should carefully evaluate our shortcuts so we can fix them later. Beware the temporary fix that becomes permanent! Specifically, we should use caution letting BBSs THAT ARE NOT UP TO FULL NETWORK NODE RF SPECIFICATIONS transmit on the backbone frequency, lest the temporary expedient become permanent and cripple the future operation of the network.

As they say on the radio editorials, "Opposing opinions will receive equal time." What do you think?

- PRM -

Brevard LAN News

Bill Newkirk, WB9IVR

Amateur radio exams are held on the third Saturday of each month in Melbourne at Florida Institute of Technology. Exams start at 10 AM and are held in Shepard Hall in the "jungle" section of the FIT campus. Exams are coordinated by the ARRL/VEC. For more information, message WB9IVR @ N2WX or call (305) 724-6183.

The SBARC Novice class is almost over with over half of the students already waiting on their Novice tickets to arrive from the FCC and four passed their Technician exams recently. The next class will be starting in January of 1987. This will be a completely revamped class including new texts that include sufficient material for those wanting to work directly on their Technician or General Class license and to cover new material required by the proposed Novice Enhancement Proposal. The class will again be held under the auspices of the Brevard Community College Adult Education System at Hoover Junior High School in Indialantic. It's expected that class fee and books will come in under $50.

The South Brevard Amateur Radio Club's newsletter, The SBARC Aardvark, is available on the N2WX-1 BBS system. Are there other clubs working on this novel way of distributing their newsletters? Message WB9IVR @ N2WX I'm interested in finding out formats, how you handle graphic information, and compress the data storage required for the typical newsletter (usually greater than 20 kilobytes for the typical Aardvark).

A digipeater is now up and running in the Cocoa, Florida, area. Call sign is W4REN. Running low power (8 watts) while system testing is in progress.

- PRM -

Packet Computing Possibilities

Chuck Harrington, WA4GPF

I found myself reminiscing today about packet radio, and what a fantastic year it has been! I also did some thinking about what changes the new year may bring to packet radio. I decided that it might be fun to make some predictions as to what packet will be like a year from now; so here goes.

The year 1987 will be a time for linking on 220; it will start off slow but I predict by the end of the year that most of Florida will be connected. The exception to this will be the panhandle area, which will unfortunately remain pretty much isolated from the rest of the state in 1987. Many users, including BBS systems will move off 145.01 onto their local LAN frequencies. Unfortunately, as the BBSs move off they will be replaced by new BBS systems in many cases, and 145.01 will remain as congested as it is now, or worse. The LAN frequencies will also be crowded by year end, and there will be a need for a second channel assignment in LANS which contain the larger cities.

The congestion will be caused by an influx of new packet stations, in fact I estimate that the number of packet users will more than double in 1987! Also contributing to the congestion will be the increased use of packet for serious purposes; file transfers, NTS messages, and other new uses will keep our packet channels humming in 1987. The "Novice Enhancement" will bring many new hams into packet radio, and quite a number of them will be computer enthusiasts who are attracted to ham radio with the thoughts of working 220 packet. Because of this, the major equipment manufacturers will market new rigs for 220, and by year end the new frontier for packet will be 220, with it's vast room for additional packet channels. Quit a few of us will be on 220 with these novices, and we may find that while they are beginners in radio, that some of them are computer wizards that have a lot to contribute to packet radio.

The BBS system will change greatly in 1987, as the Xerox 820s are gradually replaced by 16 bit machines with hard disk capacity and more memory. Some of the Xerox 820s may remain for mailbox use only, but the traffic will be so heavy that there will be little room for downloadable files. RLI type commands will remain standard, although many enhancements will be made to BBS software. The new BBS systems will have a lot of Public Domain software as the Packet BBS systems "come of age" and more closely resembles typical telephone BBS systems as they currently exist.

In 1987, the multiuser features of the new TNCs will be greatly used, and roundtable type QSOs on packet will be common by year end through the use of new TNC and terminal software. The 2400 baud rate will not catch on, though used by a few from time to time; most of us will continue to use 1200 baud on VHF in 1987. I expect to see at least one new TNC in 87, that will be a big technological breakthrough and that may set the stage for big changes in the future

Our computers will change in 1987 too, with the Commodore 64 continuing to be replaced by IBM clones or 16 bit machines by many users; this has already started to happen in the past few months. At year end, the C-64 will still be popular, but many will have been upgraded.

All in all, 1987 will be an exciting year. Linking is going to be a lot of work, and we need to do what we can to prevent some of my predictions from coming to pass. I really want to see 145.01 become a channel free of BBS system traffic, where we can all DX or just enjoy real time connects across the state. Also, I don't want to see the Florida panhandle isolated; we need to do what we can to see that this prediction is not realized!

Well, those are my predictions for 1987; perhaps a year from now we can reflect about their accuracy. In the present, I am happy to report that PACK-ET-TERM, my free packet radio terminal program for the Atari ST, successfully transferred itself from Orlando to Jacksonville via the the K4OZS BBS in Ocala. The program was a 29K binary file that was transferred in 11 pieces. With a lot of interest in getting BHP (Blocked Hex Protocol) implemented on the C-64, I think my prediction of a lot of file transfers was pretty safe. By the time you read this in PRM, the details of the BHP protocol should be available on the Florida BBS system, and I will try and get it into next months PRM. Also, I expect to release PACK-ET-TERM version 3.2 in January, which has the BHP file transfer implemented in it.

Let me wish all PRM readers and packet users everywhere the happiest of New Years, and I hope to be connecting with many of you in 1987.

- PRM -

National Digipeater Survey

Bob Schlussler - N4BLD @ K4AHO
P.O. Box 140948
Orlando, FL 32814-0948

During the previous month many of you have probably seen my digipeater survey form on your local packet BBS.

What I am trying to do is create a computerized database of all the packet digipeaters in the country. I decided to tackle this project after trying to find a current digipeater map or connectivity matrix for Florida and the best I could find was something dated November 1985. I thought about it and figured that if there was a lack of current data for Florida it was likely that a similar problem existed in other parts of the country. I designed the survey form and put it on the local BBS for forwarding to the rest of the country. As I had hoped, the BBS forwarding system worked and I began to receive completed surveys.

The information stored for each digipeater includes both background information (call sign, frequency, location, etc.) and connectivity information. I have written a program that processes the database and automatically generates a connectivity matrix.

Continued on page 22.

RMPRA › PACKET

The Official Newsletter Of The Rocky Mountain Packet Radio Assn.

Dateline: The Continental Divide

Bob Gobrick, WA6ERB
President, RMPRA

HAPPY HOLIDAYS: The RMPRA gang would like to extend a Happy Holidays Greeting to all PRM readers. If you think 1986 was exciting in packet radio just wait to see what 1987 has to offer.

NEW TOY FOR CHRISTMAS: The newest packet toy in the Rocky Mountain area and what may be the Xerox 820 of the GTE world is the GTE XT300E ActionStation. The ActionStation is a semi-dumb (semi-smart) terminal with a 80 column 9 inch screen, full ASCII keyboard, built in two line telephone/speakerphone, 12 key telephone pad, built in 300 baud modem, two RS-232 serial ports and firmware that supports a 50 memory dialup/connect/logon sequence with control of the RS-232 ports, text editor and a host of other bells and whistles. The unit was built in France (I imagine for the grand Franco government project of having a teleterminal in every French home) and listed for $1295. Well in the grand style of the Xerox 820 computer, GTE is dumping these brand new units for $245 (and fully assembled at that). Well how does it work with packet - Magnifique. I have used my unit with the TNC-2 and AEA PK-232 (turn FLOW OFF in both cases) up to 9600 baud. The second serial port comes in handy when using a serial printer for hard copy. It is a real pleasure not tying up my computer for packet and at the same time having a nice full screen of text. This becomes even more exciting when you receive a phone call on your telephone/speakerphone and you proceed to carry on a conversation while you type a message on packet (sort of leads to nervous breakdowns - but that's normal for packeteers). The unit is available from your local GTE Communications Center or 404-441-1314.

MORE NEW TOYS FOR CHRISTMAS: Well the good old TAPR TNC-2 has only been out for a year and a half and already we are beginning to see second generation equipment cropping up (it's nice to see our American manufacturers marketing like the Japanese). Some new toys that have been just introduced:

AEA: Following in the footsteps of the popular PK-64, PK-80 and the very popular PK-232 multimode data controller comes the PK-87. The PK-87 is AEA's TNC-2 replacement with a bevy of new features: new firmware commands, software selectable modem tones and terminal baud rates, additional LED's (you really do need to have some BELLS and WHISTLES for your money - Kantronics KAM take note). Internally, the TAPR specified modem header disconnect remains (needed for future linking and AMSAT applications) and looks like the AMD 7910 World Chip demodulator has replaced the EXARs.

PAC-COMM: Everyone is waiting Pac-Comm's newly released single and dual ported digis - the DR-100 and DR-200. Many folks who are experimenting with Level 3 switches and TCP/IP internet protocol have orders in for the two ported version in anticipation of moving to higher frequencies and higher baud rates for level 3 transmission. It looks like the le ported DR-100 will make a nice compact and inexpensive Level 2 digi or Level 3 Switch. Right after these two releases Pac-Comm let loose with the new TNC-220 (replacing the TNC-200). Again we see the AMD 7910 World Chip demodulator but this time it is configured to be software switched between two radio ports, allowing VHF and HF hookups. An active HF band pass filter is included and options call for a future internal tuning indicator. The modem disconnect still remains standard. The price of the kit and wired unit is very attractive considering the price increase of the popular MFJ 1270.

GLB ELECTRONICS: One of the classic digipeater TNC's is the GLB PK1L which now has a new lower price. Out here in the Rockies one of the most reliable mountain top digis to date (knock on wood) is Steve K0GUZ's Sunlight Mountain unit. The digi has been chugging along for near a year on the 25ma GLB PK1L. If you are looking for a very low current drain unit (solar cells will probably do it) the PK1L is the unit.

KANTRONICS: Like the AEA PK-232, Kantronics has just introduced their new multimode data controller the KAM (Kantronics All Mode). The unit relies heavily on the features of it's popular UTU-XT unit and should be a good seller. Like the KPC-2, the KAM does not follow many of the standard specifications of the TAPR TNC-2 so don't plan on TNC-2 type firmware upgrades or easy access for an external modem disconnect. Kantronics is also offering VHS or BETA packet videos (watch out MTV) and software packages for popular computers.

MFJ: I don't know what MFJ has in store, but you can bet whatever it is it will be a tough act to repeat their very successful MFJ-1270. I have still found the MFJ to be the best RFI-proofed units out of the TNC-2 clones (and I have owned one of each). It seems that when they redesigned their PC board to accommodate the TTL interface they added just a little more ground plane in to make the difference.

COMPUSERVE HAMNET: TAPR has finally moved DRNET to Compuserve's Hamnet and things are getting pretty lively there. The Grandfather of Packet Radio, Lyle Johnson, WA7GXD, (he really isn't that old) has been checking in fairly often and hosting quite a few questions about packet. It's a pleasure to read Lyle's responses. To update everyone about Compuserve - the Hamnet section (GO HAMNET) is the place where it's all happening. Scott W3VS (a TAPR Director) has been hosting Hamnet from the beginning. Hamnet is broken up into a number of subsections such as the Roundtable, Satellite, SWL, etc. The subsections of interest to packeteers are S9 - Packet/RTTY/AMTOR and the new S7 - TAPR - DRNET. If you have a question about packet or would like to follow the latest thread on where the leading edge of packet is this is the place to be. Sign up and give Compuserve a try - if you need help, Scott and

Continued >>>

Those Funny Packets Down In the Springs...

Bdale Garbee, N3EUA

At about 10:30am on Saturday, 22 November 1986, Andy Freeborn, N0CCZ, and I became a footnote in the packet history books by being the first people to have a successful TCP/IP [Transmission Control Protocol/Internet Protocol] transaction on the air using AX.25 UI frames for a true datagram-oriented protocol.

The software we used was the TCP/IP protocol package written by Phil Karn, KA9Q, and myself, along with the implementation of the KISS host-to-TNC protocol written by Mike Chepponis, K3MC, for the TNC-2 hardware. The hardware on each end consisted of PC clones connected to TNC-2s with KISS ROMs. Despite a poor RF path between our locations, we managed to have a lengthy keyboard-keyboard Telnet session, while I simultaneously transferred a 12k file from Andy's PC to mine using FTP [File Transfer Protocol]. On-air testing of the SMTP [Simple Mail Transfer Protocol] Mail implementation (which is my contribution to the TCP/IP package) will occur before you read this.

So what's so special about all this? TCP/IP is the name of a family of protocols that implement a layered network originally developed under DOD grants for use on the Arpanet, and which is now widely used as a de-facto standard in both the academic and commercial worlds. Implementations of the protocols are available for everything from PCs and Macs to the Cray supercomputers. A discussion of the relative merits of the TCP/IP protocol family would take more space than I have for this article. Let me just say that they are one available option for the "next generation" of packet operation. In my humble opinion, they represent the BEST option.

Andy and I are currently working on getting the kinks out of the software, and determining by trial and error the best parameters to use for the lowest protocol layers for real on-the-air use. The higher levels of the protocol family have been thoroughly tested already using hardwired lines to my Unix system here in Colorado Springs, and by Phil Karn against a different manufacturer's Unix system at his home in NJ. All of the code is written in C, and currently runs on the Xerox 820 and IBM PC compatibles. It should not be difficult to port to any system with reasonable resources and a good C compiler. And unlike much of the existing packet software, we are releasing full sources for distribution.

Andy and I are already making plans to install the first IP Switch in Colorado Springs. The closest analogy in the current packet scene to a packet switch is a digipeater, but a switch is much much more! For one thing, operation through a switch is essentially transparent, in that you will not have to explicitly specify the routing.

Once we have a switch on the air, we will be working to get more hams on the air running TCP/IP in Southeast Colorado, and will simultaneously be working with the folks in Denver to get a switch on the air there. Our current plans for starters are to use IBM PC clones for the switches, equipped with TNC-2s. Software is almost complete for the Pac-Comm PC-100 card, which will make it easy to use one frequency for local operation, and a second to link the switches. Once the software is more stable, the hardware requirements for each switch will be reduced to a PC clone motherboard, power supply, PC-100 card, and RF gear. The software will be placed in ROM in the sockets normally used by BASIC. For now, it will be easier to test and twiddle with full clones at each switch, and the software on floppy.

If you want to learn more about TCP/IP, or just networking in general, there are a couple books you should check out. One is called "Computer Networks" by Tanenbaum. This has a good explanation of Datagram vs. Virtual Circuit networks, addressing, and so forth. Another book which is very pro-TCP/IP is Padlipsky's "The Elements of Networking Style". Finally, there are a large set of papers collectively called "Requests for Comments" that are published on the Arpanet, the more interesting of which are available on my Fido phone BBS, along with all of the sources and executables to the software we are now running. The BBS can be reached at 303/593-0766, 300/1200 baud. Make sure to leave me a note if you check in. I'll be happy to try and answer any questions about what we're doing, and/or to help anyone get on the air with TCP/IP!

- PRM -

DATELINE continued from page 19

some of his assistant sysops like Norm, W2JUP, (author of PK-232 manual) and Jim, K9EI, (author of "Get ***CONNECTED to Packet Radio") are available to help out..

KISS IN COLORADO: This month's RMPRA lead article is an update status of KISS in COLORADO (this is not a rock group) by Bdale Garbee, N3EUA, of Colorado Springs (home of the Olympics Hall of Fame). BDale is one of the prime coders of the TCP/IP code effort kicked off by Phil Karn, KA9Q. If we in the Rocky Mountains may boast a little - (until proven differently) RMPRA takes claim to the first live amateur packet IP datagram QSO using the TNC-2 KISS code. Bdale and Andy Freeborn, N0CCZ, reconfigured their TNC-2 EPROMs with new code and carried on the first QSO on November 22.

- PRM -

RMPRA MEMBER NOTE: As a reminder, please check your mailing label for expiration of your RMPRA membership. If you have any corrections please contact the RMPRA membership chairperson Norm Miller, N0ENN.

- Memebership: **NEW POLICY** - RMPRA annual membership dues are $20 for new members and $15 for renewing members which includes a year's subscription to Packet Radio Magazine (including TAPR's PSR) and the quarterly RMPRA>PACKET regional newsletter.

- Newsletter material for RMPRA - by mail, Compuserve Hamnet (70466,1405) or WA6ERB PBBS via K0HOA HF Gateway.

- Address for all RMPRA business:
Rocky Mountain Packet Radio Association
Bob Gobrick WA6ERB 303-986-0189
14311 W. Virginia Dr.
Lakewood, CO 80228

- PRM -

TEXNET Network Update

Tom McDermott, N5EG

(Reprinted from TPRS Nov 1986)

In the last three months the following progress has been made towards getting the TEXNET network running:

1. We got the K9NG modems, and the FM-5 220 Mhz. radios running and passing traffic at 9600 bps. The statistics: during a four hour period on Sunday, November 16th, over 4000 packets sent/received with 94 retried, a throughput efficiency of 98%. We used 220 Mhz, FM-5's running 7 watts at both N5EG's and WB5PUC's locations. N5EG's antenna is at 90 feet, receiver front-end has a stripline filter to knock out image reception from the channel 11 and 13 carriers. WB5PUC's antenna is about 20 feet, no filter. The path is 12 miles by air. Signal levels were full quieting.

The K9NG modem is a very good modem, but there appears to be considerable variation in the performance of different FM-5 220 Mhz transceivers. In order to compensate for the performance differences in our FM-5 radios, we made about 10 modifications to the modem, the most significant of which incolved adding an adjustable group-delay equalizer (at baseband). This circuit cancels some of the undesirable time-delay distortion introduced by the 455 khz ceramic IF filter on the FM-5 radio, and resulted in a significant improvement in the received 'eye' pattern.

Other changes in some of the coupling circuit time constants, the decision-level generation, and the addition of some hysteresis in the carrier-detect circuit were also made. With this, we were able to very reliably pass data at 9600 bps. Unfortunately, the path length is limited by the FM-5 radio, as TV channels 11 and 13 video carriers render the radio almost unusable. We've built an RF filter to improve the front-end selectivity of these radios. Because of all of these problems, and the difficulty of others being able to duplicate our results, we are looking quite seriously at using 440 Mhz. converted commercial radios for the high-speed network links instead of the FM-5. Tests with the FM-5 radios at 'normal' link distances will continue.

2. TEXNET will utilize the WB5PUC's software. Tom Aschenbrenner, WB5PUC, has re-coded all of the TEXNET software layer-3 code from 'C' to assembly, reducing the size of the code, thus fitting the layer-2, layer-3, and numerous other features into a single 16k-byte EPROM. He has improved the quality of the code, added much better error handling, and added many features. Tom has done an incredible amount of work on this package, starting in January 1986, and working full-time on it since. It is doubtful whether the project could have ever gotten off the ground without his effort.

3. The software has both TNC-2 'clone' and also TEXNET NCP compatible versions, for single or dual ported network nodes, respectively.

4. Four TEXNET network nodes are up and on the air in the Dallas area. We are currently using the 2-meter 1200 baud links as inter-nodal trunks until the high-speed radios are ready. The TEXNET datagram based layer-3 protocol has been shown to work quite well. Our tests of the datagrams show very rapid response with 9600 baud links between the nodes.

5. WB5PUC has added a number of very nice features to the network nodes, including statistics formatting, network time-keeping, numbered network error codes, and he is working on some future network features and enhancements.

-PRM-

TEXNET Design Review/Preview

Texas Packet Radio Society (TPRS)
P.O. Box 831566
Richardson, TX 75083-1566

(Reprinted from TPRS Nov. 1986)

The initial plan is to put nodes in place from the Dallas/Ft. Worth area to Waco/Temple as phase 1. This will be a test of the network hardware in an installed configuration. We want to throughly test the node under actual environmental conditions. We'll need to install 3 to 4 nodes approximately 30 to 40 miles apart to reach the Waco/Temple area.

Phase 2 of the network installation will branch south to San Antonio and southeast to Houston. The spacing will be much the same. By this time, whatever engineering challenges found in phase 1 will have been removed from the nodes we place in this phase. We believe an additional 7 to 8 nodes on each leg will be necessary to reach San Antonio and Houston from the Waco/Temple area.

The challenge:

To complete the work for Phase 1 and 2, the society needs this essential help:

1. Amateurs and clubs to do the "legwork" involved in securing sites (starting now).
2. Amateurs and clubs experienced in digital and PC board construction to join the "assembly line parties" we'll be organizing to build the controllers, modems, and power supply/battery chargers for the nodes.(sometime after 1/1/87)
3. Amateurs and clubs to secure radio equipment, particularly the 2 meter transeivers that will be necessary to provide a local port on the network (beginning now).
4. Amateurs to do the tower work to install the nodes.

If you or your club would be interested in any of the listed activities please send Tom McDermott or Bill Wade. Message either via the MWD mailbox or via US mail. We'll be organizing activities to be scheduled in the next few months.

If you have a site that you have already secured access to and/or you have the authority to approve the placement of a network node, TPRS would like to talk to you. Please send a letter or message to us.

Continued >>>

TEXNET REVIEW continued from page 21.

TPRS can and will supply the technology to other groups and clubs to help build network nodes. The idea of a small network to Houston and San Antonio from Dallas/Ft. Worth is to provide the central core of a system thatr will cover the entire state. Nodes can be placed by other organizations and can be coordinated with the nodes placed by TPRS. TPRS is not going to be able to totally blanket the state without help from other organizations. If your organization is interested in a cooperative effort or in organizing your own "assembly line parties" please contact us and we'll bring you up to date on the specifics of the hardware and software design.

Bill Wade
600 Via Sevilla
Mesquite, Tx 75150

Tom McDermott
265 Daniel Dr.
Plano, Tx 75074

-PRM-

Additional TEXNET News

By Bill Wade, WD5HJP

(Reprinted from TPRS Nov 1986)

1. On November 3rd, we took delivery of 12 used series 700 RCA 450 Mhz rigs from the city of Dallas. These mobile tranceivers had been removed from service and were put up for bid. These PIN diode switched radios are crystal controlled, phase modulated, double IF receivers with 25 watt transmit amps. There are many of them currntly in use as amateur repeaters, so they have a known track record. We'll be modifying them for 9600 baud FSK transmit capability and broadening the response of the receiver IF's for use as the network spine.

2. Use of these radios will require a minor size modification of the box we had intended to use to house each of the net nodes. Also the battery charger/power supply will be modified to accomodate the increased current needed. We believe we'll be gaining a much improved reliability and an improved S/N figure for each of the links.

3. We've arranged to have the equipment aligned and tested by a ham very familiar with the rigs here in the Dallas area. We anticipate being able to set up a test of the radios and nodes running at 4800 baud within the next few weeks.

4. There is the possibility of obtaining more of these radios for use as additional links in the network. Currently RCA is out of the 2-way radio business and more of this type of equipment will become available throughout the state as municipalities, utilities, etc. replace them.

5. We have contacted the Texas VHF-FM Society to coordinate a single wide channel simplex frequency for use throughout the state. The frequency we'll be using is 445.1 Mhz. Although we'll be simplex, we had asked for a coordination so that TEXNET will not interfere with other amateur operations.

-PRM-

SURVEY continued from page 18.

This means that it is a relatively simple matter to generate a current connectivity matrix whenever the database is updated. I am also working on a program which will use computer graphics to generate a digipeater map. Further, by collecting data from the entire country, I hope to eliminate the need for parallel efforts by other amateurs.

The initial response to the survey has been very encouraging. I have received completed surveys from various parts of the country including Florida, Massachusetts, Washington D.C., Mississippi, Maryland, Georgia, New York, Iowa, Minnesota, Nebraska, Connecticut, Kentucky, and New Jersey. Data for Florida is almost complete and I hope to release a current connectivity matrix for the Sunshine State within the next week or two. I will release a connectivity matrix for each state as the data for the state becomes complete. The matrices will be available via the packet BBS system and will hopefully be published in future editions of this newsletter.

However, for this project to succeed I need your Help. If you are a digipeater operator or trustee and have not already done so, please complete and return a digipeater survey form. You should be able to find a copy of the survey on your local packet BBS. The survey is addressed to DIGIOP. To find it you can use the "L> DIGIOP" command (WORLI and compatible BBS's). Please send me a message if you cannot locate a copy of the survey on a BBS in your area.

The usefulness of packet radio for other than local communications is directly proportional to the amount of current and accurate connectivity data available to the operator. I hope the results of this survey will benefit both experienced packet operators and newcomers to packet radio.

- PRM -

Results of the FADCA 1986 Board of Directors Election are as follows:

W1BEL	Gwyn Reedy	Brandon	177 votes
K4NTA	Ted Huf	Stuart	174 votes
N2WX	Howie Goldstein	Melbourne	147 votes
K4AHO	Jim Diggs	Orlando	130 votes
K4OZS	Larry Phelps	Ocala	127 votes
W4PCM	Dick Klein	Jacksonville	102 votes
WA4GPF	Chuck Harrington	Orlando	95 votes
WA2HFA	Robert Jankuv	Boca Raton	83 votes

Congratulations to all!!

Jim Diggs, K4AHO, FADCA Election Manager

- PRM -

TROPICAL HAMBOREE
Miami, Florida
Feb. 7-8, 1987

The 27th annual Tropical Hamboree will be held February 7-8, 1987 at the Dade County Youth Fair grounds. This year the theme of the Hamboree is the 'Future of Ham Radio'. Packet radio will play am important part of the future of ham radio. One of the speakers will be Lyle Johnson, WA7GXD, president of TAPR.

- PRM -

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NEW PROGRAM

UTU-TERM/PACTERM for IBM and compatibles.
Works with UTU, UTU-XT, Packet units, & KAM.
Disk – $29.95 retail.

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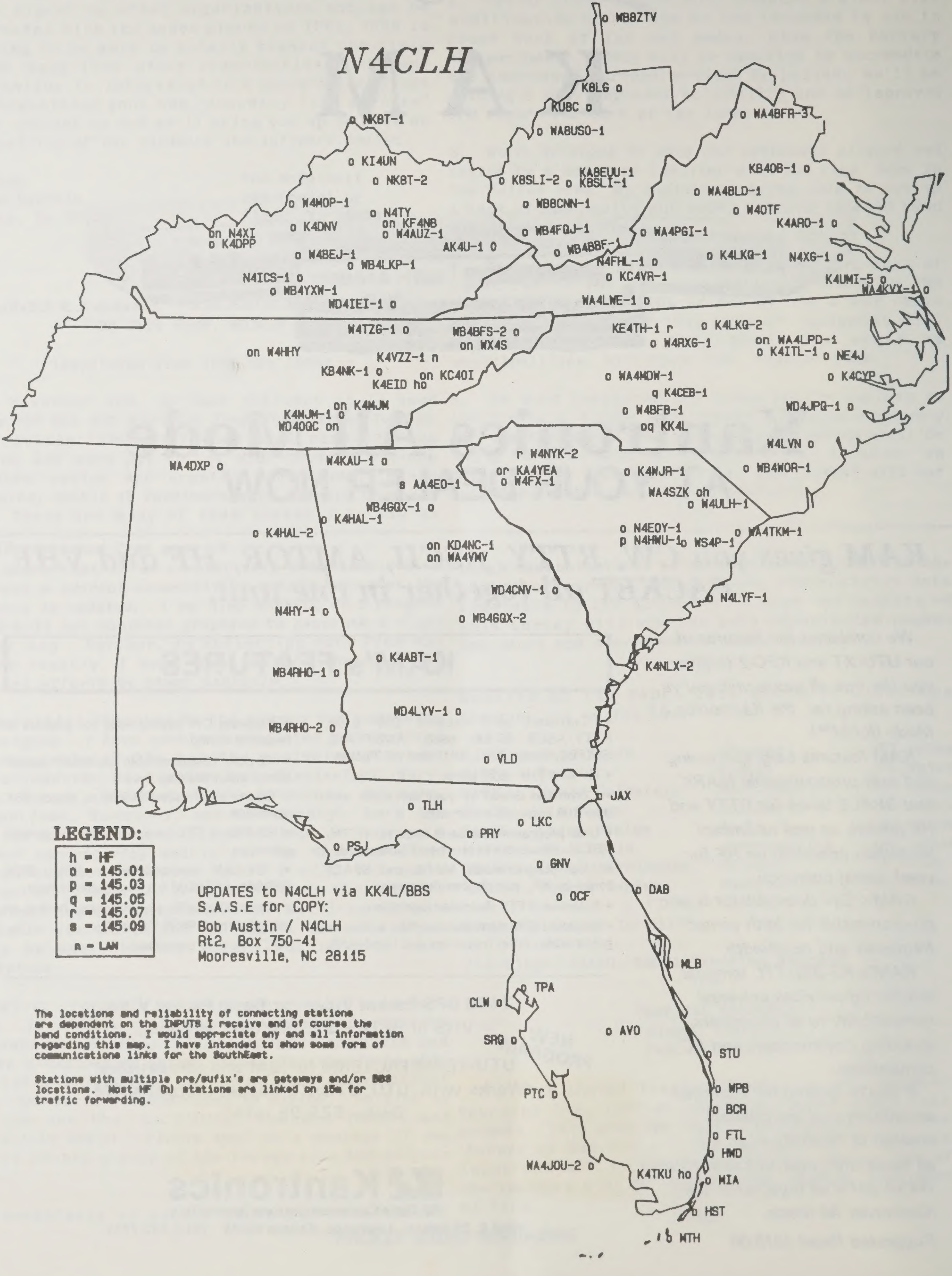
November 25, 1986

N4CLH



LEGEND:

h = HF
o = 145.01
p = 145.03
q = 145.05
r = 145.07
s = 145.09
n = LAN

UPDATES to N4CLH via KK4L/BBS
S.A.S.E for COPY:

Bob Austin / N4CLH
Rt2, Box 750-41
Mooresville, NC 28115

The locations and reliability of connecting stations are dependent on the INPUTS I receive and of course the band conditions. I would appreciate any and all information regarding this map. I have intended to show some form of communications links for the SouthEast.

Stations with multiple pre/sufix's are gateways and/or BBS locations. Most HF (h) stations are linked on 15m for traffic forwarding.

PACKET RADIO GOES PORTABLE

GLB ELECTRONICS
presents

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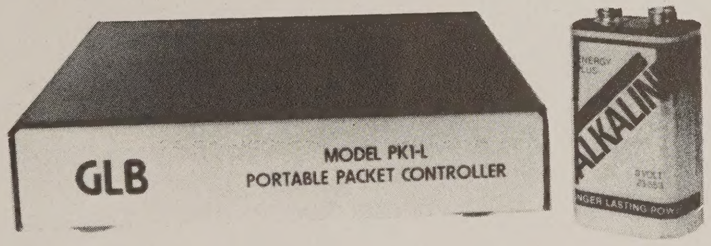

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4.6 X 5.9 X 1.0 inches

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12 ozs.

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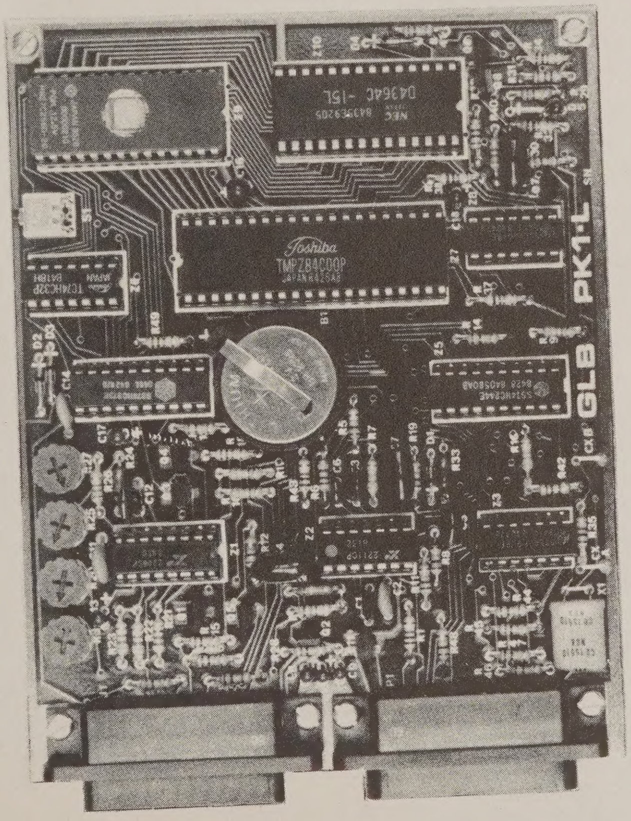


GLB ELECTRONICS, INC.

151 Commerce Pkwy.,
Buffalo, NY 14224
716-675-6740 9 to 4

Or This Inexpensive

It Really Shouldn't Be This Easy

Remember just a few years ago, how it took a roomful of equipment just to work RTTY. And if you wanted more than one mode it took a dedicated computer system costing thousands of dollars. The new AEA Pakratts are proving it doesn't take lots of equipment or money to enjoy working all bands in five different modes.

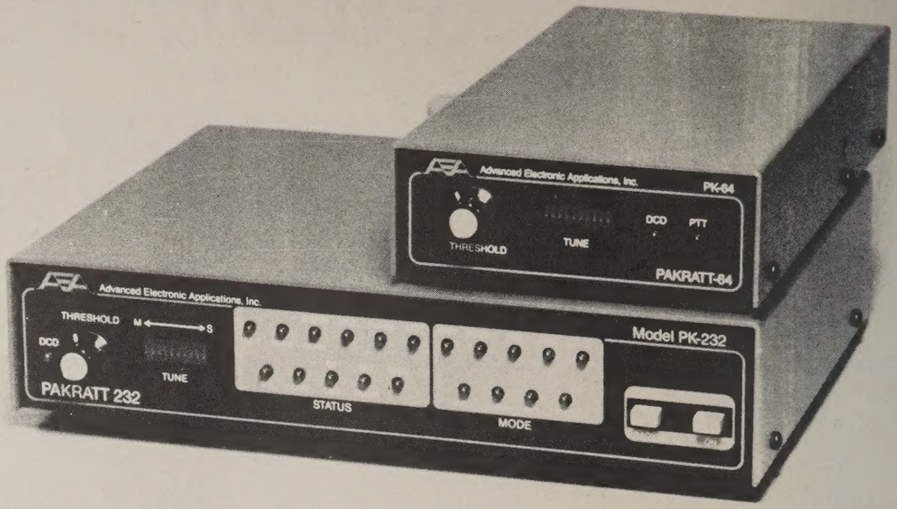
First, A Good Idea

The idea behind the Pakratt is very simple. One controller that does Morse, Baudot, ASCII, AMTOR, and Packet, and works both HF and VHF bands. Of course the decoding, protocol, and signal processing software must be included in the unit, and connection to the computer and transceiver have to be easy. The unit also has to be small and require only 12 volts, so it will work both in the shack and on the road.

Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

PAKRATT$^{\text{tm}}$ Model PK-64



PAKRATT$^{\text{tm}}$ Model PK-232

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW Fc = 800 Hz, BW = 200 Hz; HF Fc = 2210 Hz, BW = 450 Hz; VHF Fc = 1700 Hz, BW = 2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs $219.95, or $319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs $269.95 or $369.95 with the HF option. The PK-232 costs $319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

AEA

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